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MODERN PLASTICS

E. F. LOUGEE, Editor
C. A. BRESKIN, Publisher
DR. G. M. KLINE, Associate Technical Editor

Of General Interest

Technical Section

News and Features

Next Month

The Eastern Premium Exhibit to be held in New York City in September will raise the timely question with many manufacturers, "What are the best premiums we can get for the money?" Perhaps the answer will be found in a story by Don Masson of Bakelite Corporation in our September issue. We have titled it "What price premiums" because it shows an unlimited variety available from one cent to five dollars and suitable to many fields.

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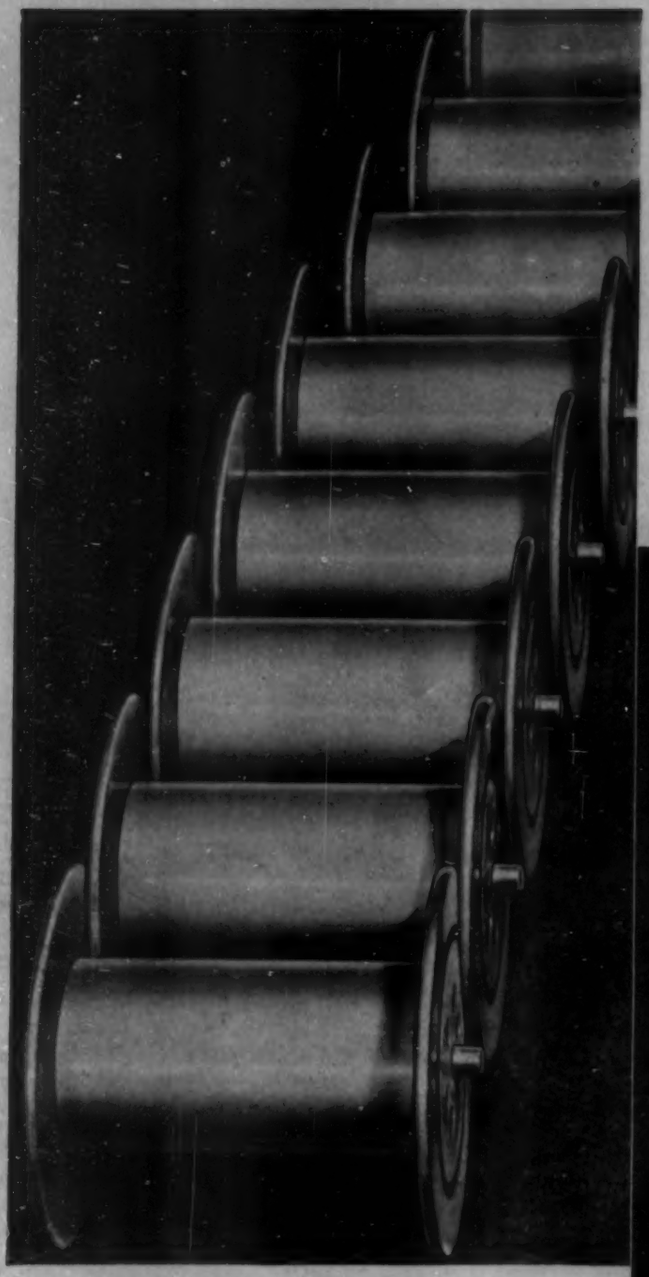

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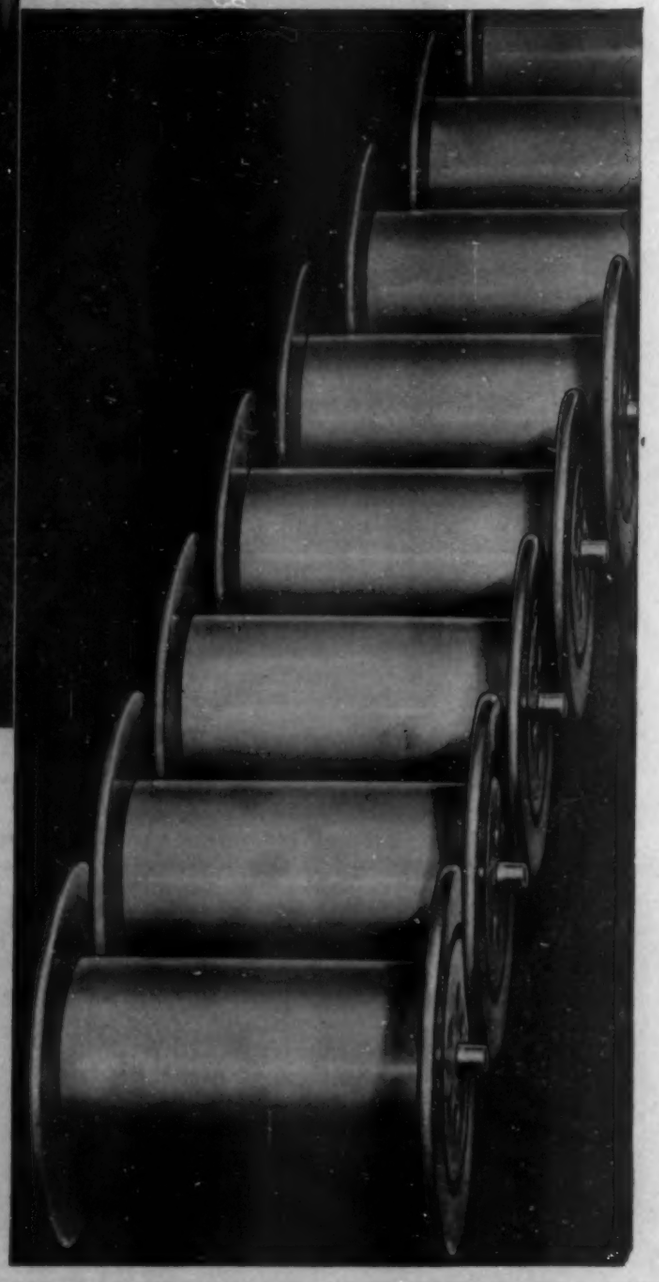

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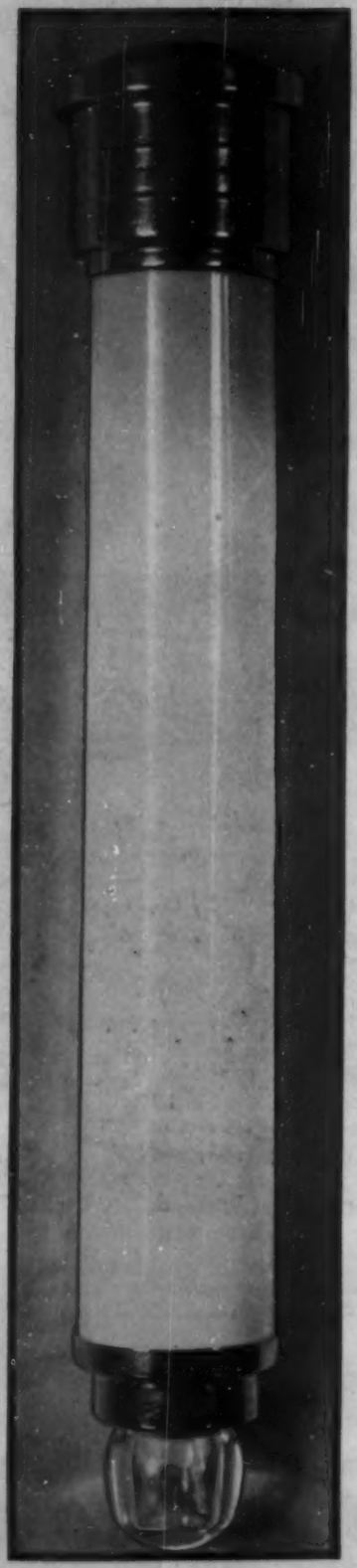

Fixture designed by Paul H. Goodell, Cincinnati, Ohio.

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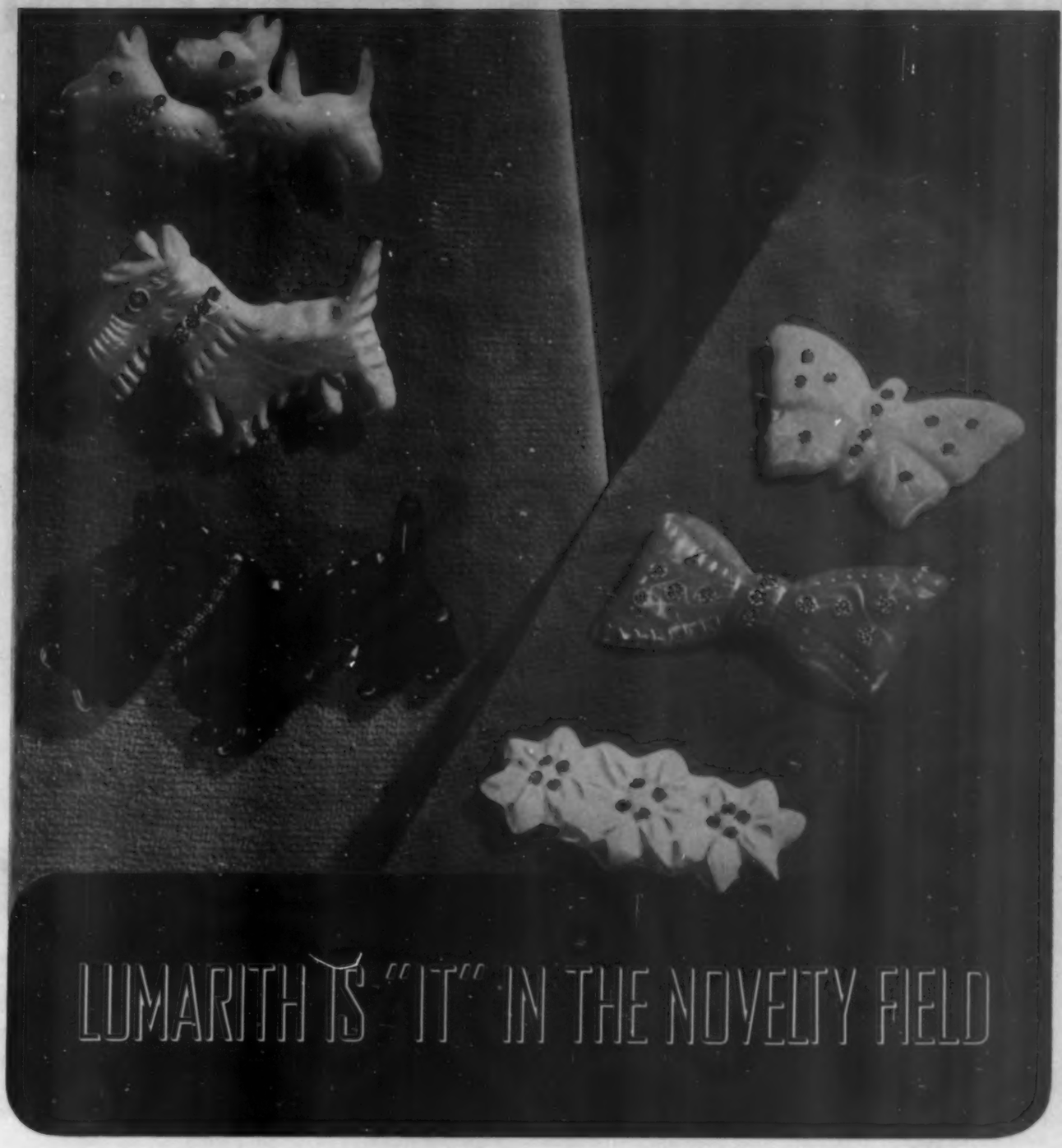

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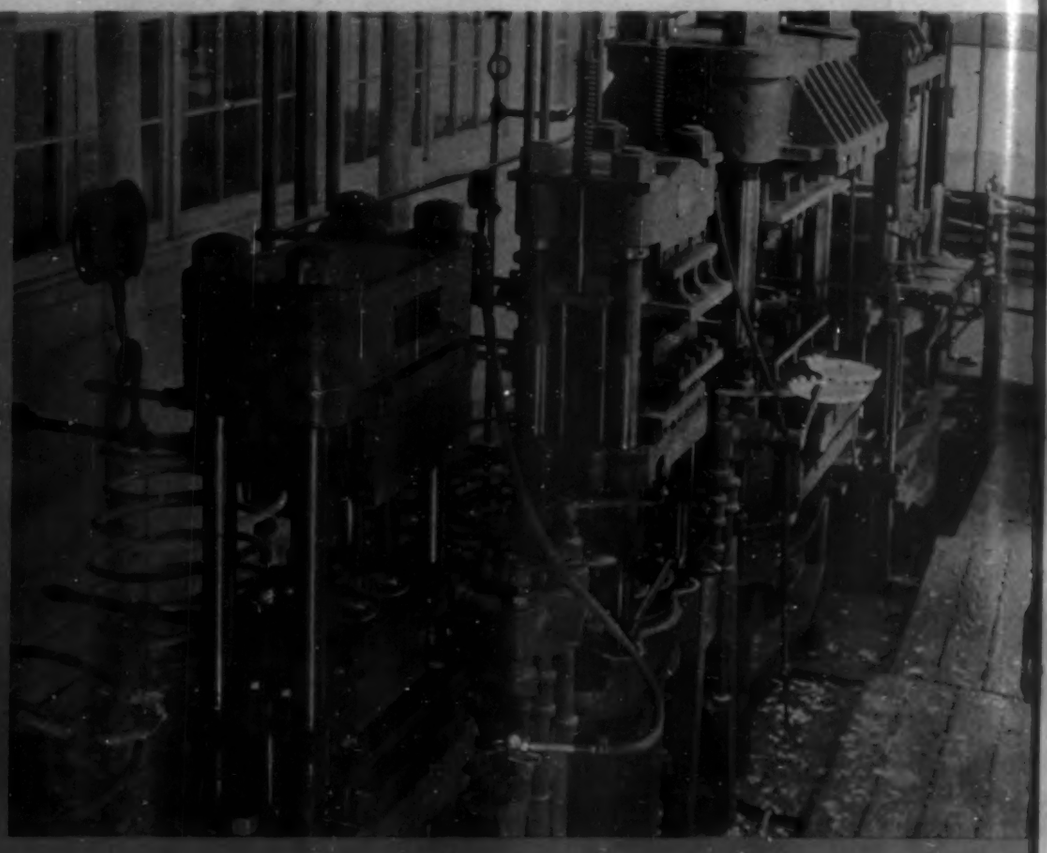

A battery of molding presses, shown above, checks the flowing properties of Beetle under actual working conditions.

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IT'S ALL COLOR AND IN ALL COLORS

MODERN PLASTICS

BRESKIN AND CHARLTON PUBLISHING CORP.
425 FOURTH AVENUE NEW YORK, N. Y.

AUGUST 1936 VOLUME 13 NUMBER 12

Original pieces made by Berkander twenty-five and thirty years ago. The pointed bar pin (fourth from left) is the first piece of Celluloid jewelry made in this country. Mr. Berkander shaped and finished it entirely by hand

Thirty years ago—and now

BY E. F. LOUGEE

SOME thirty years ago, a young man on his way home from work in Providence, Rhode Island, stopped to look into the windows of Tilden & Thurber, leading jewelers of that city. His eyes fell upon a beautiful toilet set of ivory celluloid and the thought came to him that if he could produce celluloid jewelry as good looking as that, he would be made. The young man was George F. Berkander, who today is the head of the firm of George F. Berkander, employing hundreds of craftsmen and craftswomen and supplying millions of celluloid and acetate novelties to department and chain stores the land over.

It all began when he looked into that window more than twenty-five years ago. He was engaged at the time making French combs and barrets with French trimmings but these were on the way out. The young and ambitious Twentieth Century was asserting its influence in women's fashions. Hair styles were changing rapidly and it was perfectly obvious to Mr. Berkander that there would soon be no need for the hair ornaments he made. He had previously had experience in making jewelry from platinum and gold, and this, coupled with his knowledge of fabricating celluloid convinced him that there was opportunity for popularly priced celluloid jewelry of good design.

He went home and tried out various things until he got what he thought were some attractive bar pins. In those days, anything in the way of a bar pin was made of metal with perhaps a few stones in it, and it wasn't long before it tarnished. He could visualize that anything made of celluloid would overcome this objection and would change very little over a period of time. One of these pins, made by hand more than twenty-five years ago, is illustrated here. It was pio-

Above—acetate flowers and costume jewelry in which hand work is obvious

Below—nautical jewelry which is popular for summer and winter cruising

Below—sports jewelry combines injection molding with hand decoration

Extraordinary detail of design is maintained in the tiny animals reproduced below

neering work and was the beginning in this country of plastic jewelry which at the present time represents some seventy per cent of all costume jewelry sold.

Creating these items was a slow process. Everything had to be done by hand. Each detail had to be considered separately because there were no precedents to be followed. Soldering parts together as done on metal jewelry was impossible. Plastics had to be treated differently. In order to fasten pins to the celluloid surface of a bar pin, holes had to be drilled into the back and some method worked out that would hold the pin securely in place. At first these bar pins were quite plain. Later, when decoration was considered advisable, still more problems cropped up for solution. Stones could not be fastened on celluloid as on metal. New cements and new methods had to be invented.

Creating new items and finding the best ways to make them were not the only difficulties encountered in those first days of celluloid jewelry. A market had to be created for them as well. That wasn't what one might call clear sailing because the idea was new. Buyers thought it was a great joke to see jewelry made of celluloid and retailers were far from being convinced that it would sell. Mr. Berkander had faith in his idea and didn't mind that buyers laughed at the product he showed them. He called on many stores and found that women buyers were the more impressed but even they were skeptical. The real credit, however, for putting this idea over should go to Miss Henrietta Graff, who was the buyer for Berg Bros., located on Lispesnard Street, New York City, at that time; but even she did not

have enough faith in the idea to place an order at once, although she admitted the articles were good and might sell. Miss Graff finally decided to place an order for three gross. Then things began to happen. Within a day or two after the receipt of the first shipment, she ordered an additional three gross; this was repeated seven or eight times and finally an order was placed for fifty-eight gross in one lot. And through the influence of Miss Graff this merchandise found its way to the counters in one of Henry Siegal's department stores, located on Sixth Avenue, New York City. The line met with instant response from the public and from then on the idea spread among the various department store buyers.

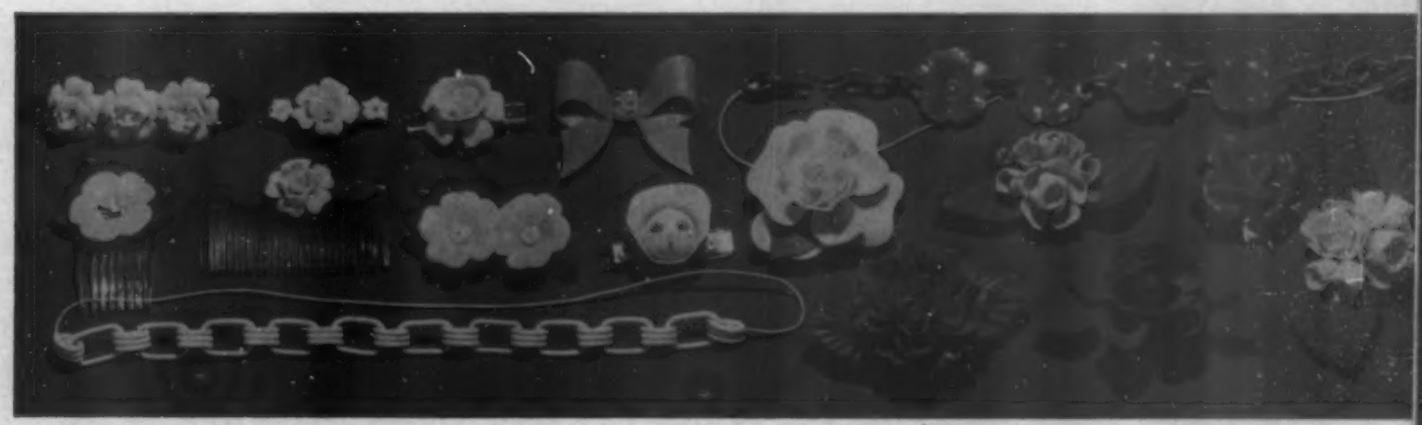
Other jobbers, watching the successful sale of these bar pins at Siegal's, became interested and before long other stores began to sell them in large quantities, too. Department stores introduced them throughout the country and good prices were maintained. Most of the pins sold for a dollar. With increased production and distribution, prices could be lowered without hurting profits and the pins soon found greatly increased sale in chain stores.

All this time Mr. Berkander had concentrated upon making bar pins. A great many different styles were designed. At first they were plain, then followed the pattern of other jewelry in ornamentation. Tiny pearls were cemented to the surface in interesting patterns. Imitation stones were imbedded in the soft satiny celluloid with rather unusual, pleasing effects.

"Recently," says Mr. Berkander, "someone has *discovered* a way to plate plastics and they consider it quite an accomplishment, but we did gold plating on celluloid more than twenty-five years ago. We still have a barret plated with pure gold which was done at that time." (This barret is illustrated in the first photograph accompanying this article.)

After a time a variety of different items were added to the well established line of bar pins. Brooches, earrings and eventually bracelets were created. With the increasing popularity of celluloid toiletware, these found ready acceptance and thus the business grew. Even then, Mr. Berkander didn't realize the extent to which plastics jewelry was destined to become popular. Nor did he sit back and rest on his laurels in a prosperous market. He remembered that French combs and barrets were once popular, too, but that they had by this time practically disappeared. He was constantly on the alert for new items to make and was one of the first to make celluloid fountain pens.

"We didn't make the first celluloid fountain pens," says Mr. Berkander. "A concern near Springfield did that, but we were the first to make them in quantity. There was a firm by the name of Saltz Bros. in New York, that came and asked us to make what they called Peter Pan Pens. Then a little advertising, and everybody was using them. This business had grown to many thousands of dollars (*Continued on page 54*)



Above—Ingenious combinations and delightful colorings in acetate jewelry

Below—happy-go-lucky favors for every imaginable occasion

The Judges of Modern Plastics Competition

RAYMOND LOEWY

HARVEY WILEY CORBETT

LURELLE GUILD

The importance of plastics in industry is clearly indicated when such judges accept an appointment on Modern Plastics Competition Jury.

FOR THE INDUSTRIAL GROUP:

Raymond Loewy, industrial design engineer
M. B. Sanders, industrial designer-architect
R. R. Williams, engineer, Bell Laboratories

FOR THE STYLE GROUP:

Marian Young, fashion editor, *N. E. A.*
Marion Lowndes, editorial staff, *Harper's Bazaar* (photograph unavailable)
J. H. Pickering, Amos Parrish & Company

FOR THE DECORATIVE GROUP:

Mary Fanton Roberts, editor, *Arts & Decoration*
Lurelle Guild, industrial designer and author
Harvey Wiley Corbett, architect

All entry blanks for competition entries should be postmarked not later than August 15, and merchandise to be entered should reach us by August 25. Judging will take place shortly after that date and winners will be announced in our October issue.

J. H. PICKERING

MARY FANTON ROBERTS

MARIAN YOUNG

R. R. WILLIAMS

MORRIS B. SANDERS

PLASTIC MODES

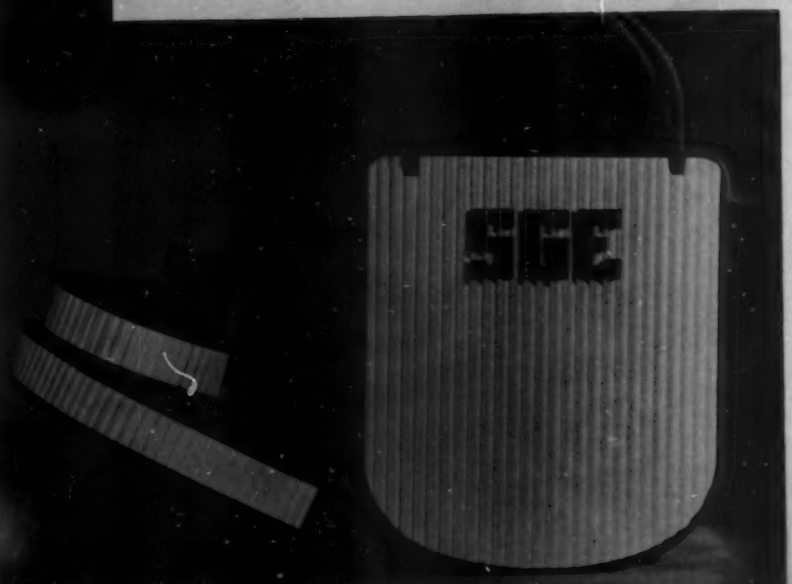
BY EVE MAIN

Plastic materials take on new style importance in this chic hat with its shallow crown of navy blue linen and medium wide cellulose acetate brim, trimmed simply with a sprawly linen bow in front. The flexible brim has a translucent quality that allows sunlight to filter softly through in a most flattering manner without the least bit of glare. It's practical, too, since the plastic material may be cleaned easily with a damp cloth and will not warp or lose its shape no matter how much the hat is worn. These smart hats are being seen on diners in side-walk cafes and restaurants and are equally appropriate for spectator sports wear as well as more dressy afternoon occasions. (Nell Langan)

LORD & TAYLOR

DUPONT

SAKS FIFTH AVENUE



DUPONT

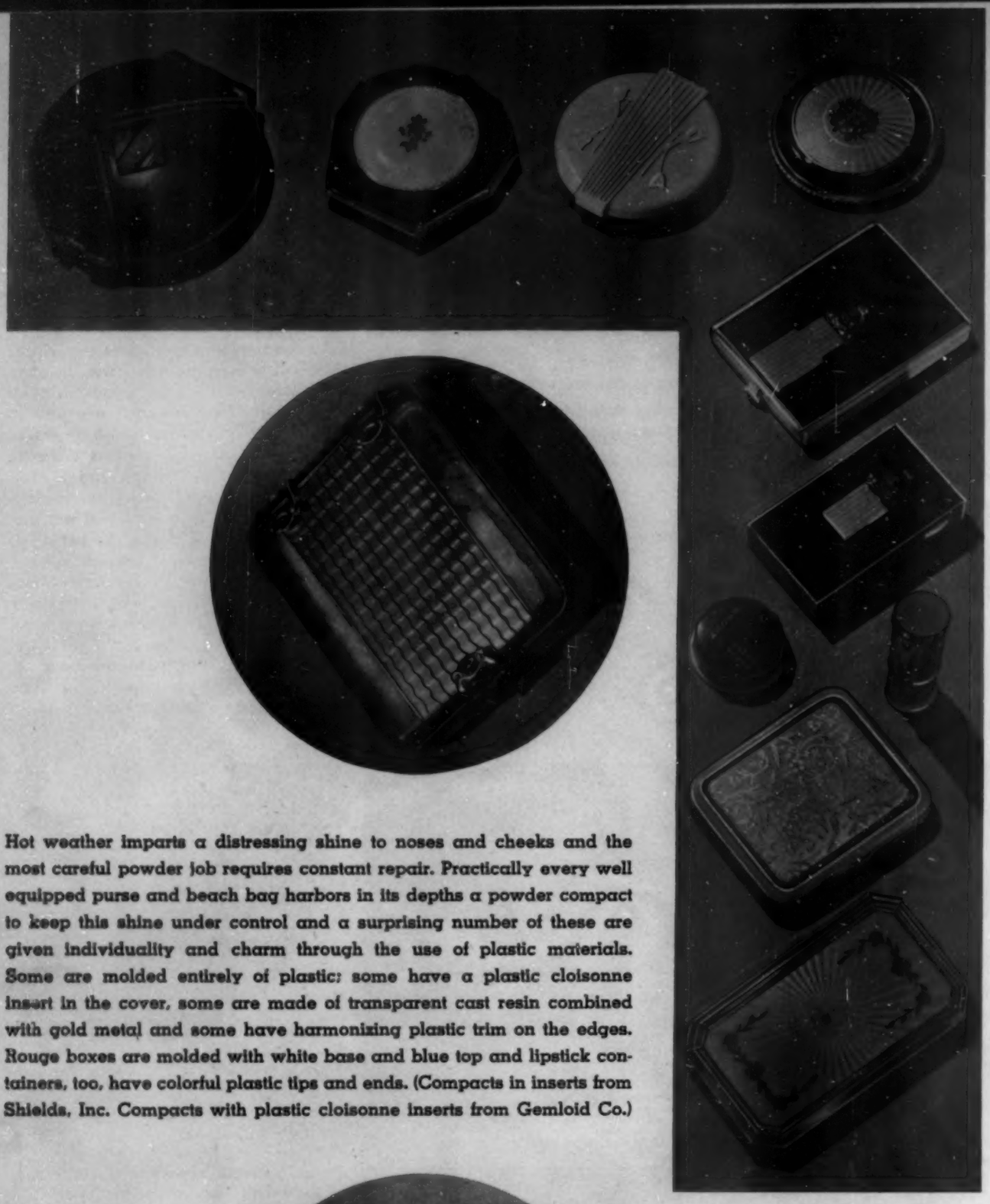
As the summer sun grows brighter and warmer the urge for white accessories increases. And plastic materials with their flexibility and easy-to-keep-fresh-and-clean features top the list of must-haves for light and dark ensembles. White bags in corrugated dull mat finish pyroxylin combined with bright green, royal, navy, London tan, zinnia, violet, brown or oxhart red linen, appear in a variety of sizes and shapes: large rounded or squared swagger bags with contrasting piping matched by bold plastic initials, or a medium size roll top bag with loop and ball fastening. The same combination of corrugated plastic with linen makes a hat band and belt to match. Even the *very young* lady is not forgotten. For her, there's a bright red vanity handbag to carry with her printed dimity frock. (Bags, Nat Lewis Purses Inc. and Pyramid Leather Co.—Belts and Hat Bands, Nat Lewis Purses Inc. (Addresses sent upon request)

SAKS FIFTH AVENUE

FRANKLIN SIMON

DUPONT

Information concerning merchandise or materials featured in these pages may be obtained by those in the trade by writing to the Plastic Modes Editor, enclosing stamp



Hot weather imparts a distressing shine to noses and cheeks and the most careful powder job requires constant repair. Practically every well equipped purse and beach bag harbors in its depths a powder compact to keep this shine under control and a surprising number of these are given individuality and charm through the use of plastic materials. Some are molded entirely of plastic; some have a plastic cloisonne insert in the cover, some are made of transparent cast resin combined with gold metal and some have harmonizing plastic trim on the edges. Rouge boxes are molded with white base and blue top and lipstick containers, too, have colorful plastic tips and ends. (Compacts in inserts from Shields, Inc. Compacts with plastic cloisonne inserts from Gemloid Co.)

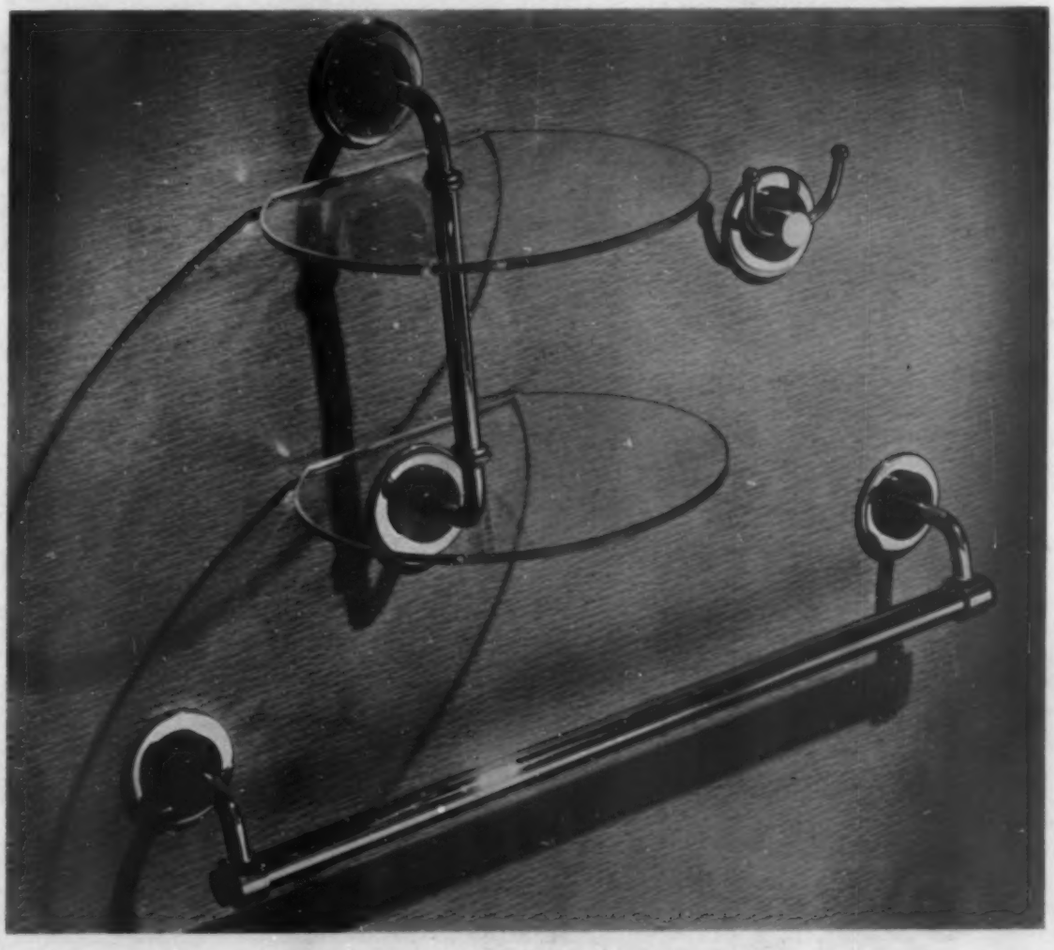
Prize-winning bath fixtures from Boston

THESE bathroom accessories were recently exhibited in Boston at the Art Industry Exhibit sponsored by the Boston Chamber of Commerce. A jury consisting of several of the country's leading industrial designers awarded them the Edward J. Mitton Gold Medal for the outstanding design under the classification of "Articles for Living" developed in New England since April 1, 1935. These entries were submitted by the J. P. Eustis Mfg. Co. who for many years have manufactured and merchandised bathroom accessories under the trade name of *The Brasscrafters.*

The jury based its award upon the product which in its opinion best performed the function for which it was designed, simplicity, and efficiency. By the use of plastics, a pleasing combination of chrome and color is introduced into these bathroom accessories and the plastic disks conceal the attaching screws and lock them into position. To remove the fixtures, the plastic disks simply unscrew and slip down on the rods when the screws become visible and easily removed. Cast resins were chosen for the purpose because of their ready machinability and brilliant colors and because they can be fabricated quickly in a variety of sizes and patterns without the necessity of molds. The fabricating and finishing was done in the plant of the Burr Chromium Company.

With home modernization progress well developed in all parts of the country, this intelligent use of cast resins and chrome will be welcomed in a wide market. The fixtures themselves are sturdy and permanent and merit a design treatment and material selection of comparable quality. The chromium finish is bright and lasting and no material complements it better than plastics. They, too, are lustrous and lasting. Easily cleaned and of pleasing appearance. Further than this, they resist the action of soap and water to which they are bound to be subjected in bathroom use. The concealed screws leave a smooth surface.

In step with today's activities in the use of new materials, classic modern design and the ultimate in functional properties, *The Brasscrafters* whose standards of quality have always been of the highest, enjoy an enviable position in the bathroom accessory field. The intelligent use of cast resins in these fixtures indicates a trend that will advance rapidly.



These interesting designs of modified modern by Pierre Chéron have been reproduced in Beetleware by the Gorham Company using beryllium copper molds

Where do we go from here?

BY PIERRE J. CHÉRON

THIS homely phrase takes on special significance when applied to resinoid plastics. It is timely and of utmost importance to every one of us who assume responsibility of guiding industry in design. Yes! And I would add with emphasis—guarding the industry, that we may pass it down to posterity with the full measure of pride comparable to a material so practical and exquisitely developed. A rehearsal of the achievements of chemical engineers in the creation and development of plastics would be superfluous to this story, further than to say that they have acquitted themselves gloriously and are continually and successfully expanding its application to a variety of specific requirements undreamed of in the past and unpredictable for the future.

A little more than a quarter of a century ago, this infant "plastics" was born. Naturally enough, its existence had to be justified. Progression through trial and tribulation has brought it through a healthy childhood to adolescence. In industry, it is still a youth but it has attained stability and a substantial measure of respect. Now we find ourselves at the crossroads of trend in design. During the recent years while plastics were getting their growth, industry became deeply interested in design. Familiar things were stripped bare of ornamentation until few but the plainest and simplest forms are to be seen. This is, in a measure, a reflection of the economies of the nation from which none escaped. Naturally enough, plastics have been designed along these lines but, since we are now emerging from this condition, it might be well to take inventory.

As we pause in retrospect and review the products fashioned from plastics, we find that they fall into one of two classifications which we might designate "apparent" and "concealed." The apparent form includes individual pieces in daily use, such as jewelry, kitchen and household utensils, boxes, ashtrays and so forth, most of which are of an inexpensive nature. In the concealed form, we find plastic parts in automobiles,

machinery, electrical appliances, scientific instruments, textiles and architecture where they are made to specific requirements. In such places the public is seldom aware of their presence. This form is being extended continually and is dependent for its progress upon chemical research and mechanical precision rather than upon design.

This is not so, however, with the classification which I have designated as "apparent." We have inherited in this material a range of possible applications far in excess of any other material with which we are familiar and too much effort has been exerted in the production of articles of the most inexpensive nature. In doing this, we have sacrificed to economic pursuit alone, the exquisite possibilities of which this material is capable. In composition, it fulfills every requirement for mechanical fabrication of the highest order. Its texture permits a range of finish from the highest polish to a most appealing mat or sanded surface in beautiful contrast. It can be tooled, engraved, carved, embossed, cast or molded to perfection. Its colors range from the strongest and deepest of manly tones to those of the most exquisite and delicate feminine delight—opaque, transparent, or color with a transparency and depth of tone unsurpassed. A veritable riot of possibilities. Realizing this, can we continue to face this abundance of beauty and neglect its decorative possibilities? I do not believe that we can without serious loss to the industry.

The production of inexpensive articles from plastic materials should, of course, be continued if for no other reason than the fact that plastics is one of the most suitable materials for articles of this nature. Such production, however, should not prohibit the materials from enjoying application in articles of most exquisite design which could be carried with credit by the best of our retail jewelers. Such articles should not be made to imitate precious metals and jewels because imitation robs both the imitation and the genuine of their own intrinsic value and appeal. Compared with personal articles of the inexpensive type, such as cigaret cases or compacts, toilet articles, etc., in spray lacquered metal or of enamel of a low fusing point, the competitive situation would be reversed. Plastics would be superior to articles of a sprayed lacquer finish, and at no greater cost if indeed as expensive, and according to industrial practices a better product at no greater cost is considered good business. By these virtues, plastics could not be classed as an imitation.

One other reason besides the economic situation, from which we are emerging, which bore heavily upon the restriction of design in plastics has been that of expensive mold costs. Steel hobs, machined and laboriously cut, have to be held to the simplest forms with decorative units reduced to a mere few lines or like treatment in order to (*Continued on page 58*)

"Irate Goose" is the name of this fountain inspired by a child who had incurred the resentment of a goose. Chéron, working in an intensive industrial era, had an opportunity in this statuette to idealize an ordinary incident in real life as a work of art for its own sake without destroying human appeal in the final design

PIERRE CHÉRON

Pierre J. Chéron, American born designer of the old school, received his first training in fine arts at the National Academy of Design, New York City. He started his life's work with the theory that applying the principles of fine arts and classics to industrial products, even in their simplest forms, would promote them to acceptance in the widest market. He claims he has yet to see that theory fail. His work as a sculptor is well known and includes Heroic Fountain, Lincoln Park, Jersey City, N. J., Memorial Portraiture Tablets, one of which is in the Public Library, Newark, N. J., and his interior and exterior architectural sculpture looks down upon this changing land in many cities. Twelve years with Tiffany and several years independent designing for silverware houses find his work represented at the Metropolitan Museum of Art, New York, Kensington Museum, England, The Louvre, France, The National Museum, Munich, and among the former Kaiser's private collection. The silver service for the battleship Louisiana was of his design.

Working independently in recent years from his studio in Connecticut, Mr. Chéron has watched the evolution of modern with interest and patience. His astute analysis of the present situation in design should be interesting to those confronted with its influence in industry, and especially to those concerned with progress of the materials and resulting products with which we are so closely allied

Molded parts for assembling economy

BY FRANKLIN E. BRILL

GENERAL PLASTICS INC.

FIVE years ago a designer looked out of the window of his New York office and ventured the prophecy that it wouldn't be long before tables and other furniture would be molded from plastic material. No one took him seriously then, and as the years rolled by nothing happened that seemed to bear him out an accurate forecaster of trends. But something is happening today, and we can only hope that he remembers his prophecy. Not that molded tables have arrived. Perhaps all-molded furniture never will. But at any rate, we see here another entry of plastics into the furniture field, used modestly perhaps, but as a very important structural part nevertheless.

The idea was L. C. Dahmen's, and the "Necessity that Mothered the Invention" was a fast, economical, and attractive method of joining the tubular structural members used in making up such items as floor ashtrays and serving stands. The Daystrom Corporation, which he organized to turn out this line of metal furniture and accessories, is working exclusively on these items, and is running sixteen to twenty-four hours a day to keep up with the demand.

A quick glance at the illustrations shows the exact function of the Durez molded plastic parts. A variety of different molded fittings are used, the simplest being used to join a vertical tubing member to a stamped steel base, to eliminate welding and to produce a clean, contrasting joint with a minimum of assembly cost. The molded member extends some distance into the tubing, being held in place by friction so that no other method of fastening is required. It is well known that black phenolic plastics and chromium contrast and combine with each other most attractively, and the Daystrom line bears this out. Similar fittings are also used on the bottom of a tubu-

lar leg, to finish it off, make it slide easier, and prevent the metal edges from scratching.

That was the basic idea, and as soon as that proved successful, other fittings with other functions were developed. As Daystrom went from simple smoking stands to more complicated four-legged ones with tubular handles at the top, it became necessary to design a fitting for joining two tubular members at right angles. As soon as this was done, there arose the problem of what to do with the hollow ends of the handles, so another fitting was developed to fit into the open end and finish it with a rounded black knob of the same diameter as the tubing. Still another problem arose when the company went into a line of rectangular stands and tea tables: something must be developed for the corners of the rectangular tray to hold both the tray and the plated trim to the tubular leg. Molded plastics again received a call and a very practical and easy-to-assemble corner joint was developed. Still other phenolic moldings serve as caster supports and ashtray handles.

One may pause at this point and inquire whether the large number of extra molded fittings involved—ranging from seven on an ashtray stand to thirty-two on a tea wagon—could possibly result in production savings. But let him remember that this assembly technique permits setting up a standard unit on automatic machines and turning it out rapidly and economically with very little hand labor. Welding of innumerable joints, corners and fittings is relatively slow, and forms for bending the tubing and metal molding into the variety of shapes, lengths, and angles required would tie up considerable money and might be rendered obsolete by change of design within a few months. The molded plastic fittings, on the other hand, lend themselves to a variety of sizes and designs and a variety of different products, as the rapid growth of the Daystrom line demonstrates.

The group of smoking and drinking accessories shown here really represents only the beginning: by using the same brand of imagination which worked it out, the Daystrom line is expected to expand considerably in the future. New designs, refinements and variations in the assembly technique will undoubtedly be developed, as the Daystrom line graduates from accessory furniture into the more important requirements for abundant living.

We cannot help but advance the thought that many manufacturers with similar manufacturing situations might reduce assembly costs through adoption of friction-fit plastic parts as Daystrom has done. Shrinkage is entirely absent, the assembly operation is simple, the material is decorative and its finish is permanent. Lamps for example, would benefit by this economy.

What about that cold supper?

By W. H. MacHALE

BEETLE PRODUCTS DIVISION, AMERICAN CYANAMID CO.

Wise retailers display smart table settings of cool plastics to invite hot weather sales

YES, what about it? The preparation and service of that cool supper on the terrace or in the dining room on these hot, still, August evenings can be an event of such charm and relaxing pleasure, that all of the discomforts of a sticky day in the city or office will be forgotten.

The modern hostess knows that a crisp salad of chilled vegetables, cold lobster, lemony iced tea, and little sandwiches will look inviting only if her table carries with it the appearance of refreshing coolness. These chilled delicacies served on Beetleware or other plastic dishes of soft pastel green or alabaster white dispel that foreboding one may feel for what is often considered to be the bane of a sultry evening—that cold supper.

A table so decorated will be fitted out with a dark blue cloth, napkins of white decorated with a blue monogram, encircled by brilliantly colored plastic napkin rings. This dash of bright color will bring into contrast the glittering coolness of the service. The motif of color is touched off by the use of silver service trimmed with plastic handles which are smooth to the touch and light in the hand.

The complete service is so light and durable that even the servants, or the visiting bachelor, who offers to carry such plates to and from the terrace, experiences no sinking feeling when a cup or knife is accidentally dropped en route. The hostess smiles wisely, knowing that these comparatively inexpensive plastic items do not break easily.

There are several points of interest to the modern hostess regarding the use of brightly tinted plastics during the summer season. Her bridge parties or garden parties present problems of decoration, not only from the viewpoint of porch furniture, summery linens, and edibles, but from the essential view of obtaining a well-blended, colorful whole, which will ally practicality with a certain unusualness and charm. She wishes to convey the impression that her well-appointed luncheon was no effort.—Happily the effort actually will be small and the results welcome.

On the other hand, if she is serving a buffet luncheon or dinner, consider the attitude of her guests

toward such a novel and satisfactory method of service. They are blissfully aware that plastic dishes do not break as easily as china if dropped—a comforting thought to those unused to balancing plates.

It is surprising the number of places one will find plastic items entering into the service of cool suppers. The table will have small molded plastic ash trays placed near attractive cigaret boxes trimmed with ivory or gay colored ureas. The table itself may be covered with a beautifully inlaid surface of laminated material in ebony black or even a pastel shade.

The twentieth century housewife is tending more and more to ease her burdens of entertaining and planning. Her care of children, her household duties, and her social life compel careful regulation and routine. In keeping with her demands for efficiency, beauty, and modernity, the plastics industry has been quick to anticipate her needs and to keep in step.

Colorful plastics both molded and cast are available in a wealth of designs for hot weather suggestions of informal service

R. H. MACY

Editorial comment

THE British Colour Council has taken steps to interest manufacturers and users of plastics in the importance of its work and we have been told recently that the more prominent material suppliers and fabricators in England are now numbered among its membership. The Council has published a Dictionary of Color Standards which is being used all over the world. It is reported to be the only publication of its kind and contains 220 colors, standard throughout all color using industries. There is a companion volume which gives the history of these colors and names by which they are known in other countries.

Quoting from an announcement in *The London Times:* "The Dictionary is primarily intended for industrial and commercial reference, but it would delight the artist or the lover of appropriate words by its spread of fascinating color tones and the imagery that has been brought to their meaning . . . The colors, other than those decided on as spectrum colors, fall into three classes—those which can be matched to the average of a number of samples, whether animal, vegetable, or mineral, such as squirrel, carrot, and sapphire and those of which the color sensation attributed to a definite color name shows a wide divergence of opinion, such as sky blue, saxe blue, and old rose. It is stated that the third of these classes was the most difficult to deal with, as in some cases names still regarded as standard were first used hundreds of years ago and the number of hues attributed to the same color name increased, for various reasons, until the original significance was lost. The variety of specimens received for each color was astounding; there were, for instance, 80 different sky blues, 60 different whites, and 40 different blacks."

THE Dictionary of Color is a beginning of standardization and understanding which will have value without end. Stylists, both here and abroad, have recognized the necessity of co-ordinating and standardizing colors for many years, in order that shoppers may find matching accessories for the costumes they choose. More recently, manufacturers of wall paper, drapery fabrics, and rugs, have increased their scope of usefulness to decorators and consumers by following the color trends of fashion; not blindly, but by intelligent, co-operative planning with those creators and agencies who anticipate and influence these trends. With plastics so closely allied with these professions of style creation and decoration, it becomes almost imperative that they associate themselves in this movement to co-ordinate colors if they are to persist.

The Textile Color Card Association, in this country, offers American manufacturers the advance information necessary to bring their product into step with current and future demands. It publishes this color information in the form of tiny samples of dyed fabric attached to cards with appropriate description and color identification. The object of the Association is to correlate colors in fashions and other industries in order to produce harmonious blendings with more or less of a standardization from one season to another.

ITS collection for Fall introduces a special group called "Pottery Tones" which emphasizes soft mellowed shades to blend or contrast with darker hues. These were developed after considerable research in museums in an effort to get actual tones from rare old pieces of authentic pottery. "Paddock Colors" another group for Fall, consist of brilliant sport hues stressing the racing theme so popular at that season. "Tailleurs de Minuit" are composed of dark and more restrained shades for evening wear, and as darker basic colors for daytime. "Opening Nights" bring a rich, glamorous note to evening fashions and are smart as contrasting accents with the darker, basic shades.

It is a natural conclusion that home decoration this Fall will take its cue from these undeniable indications. The creation of style is a powerful motive for sales. Once let a trend become established and there is no stopping it until it has run its course.

Since plastics have established themselves as cast and molded color, is there any valid reason why they should cling to the inadequate range of hues in which they have become known! Isn't it reasonable to assume that the demand for these materials will increase with their recognition of, and adjustment to, prevailing styles and trends! Boiled down to its purest form, good merchandising consists simply of offering the public what it really wants to buy. The trick is, to know in advance just what that is going to be.

Stock molds

SHEET SEVENTEEN

PREMIUM items of plastics are available to manufacturers and advertisers without original mold costs and may be obtained in interesting variations of color. Molded tambour material shown in item #344 comes in sheet form and may be easily combined with other materials. Please mention sheet and item numbers when writing.

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

332. Display easel for sale card; overall height 2 in., triangular base 3 in. from corner to corner

333. Five-year calendar and memo pad; streamlined; width 3¾ in., length 8½ in., height 1¼ inches

334. Thermometer base, decorated; diameter of base 5 in., slit ⅞ in. long across inside center

335. Walnut display easel; standing height about 4 in., 2 in. wide

336. Display rack for plates; 4 in. high, 3¼ in. wide at base

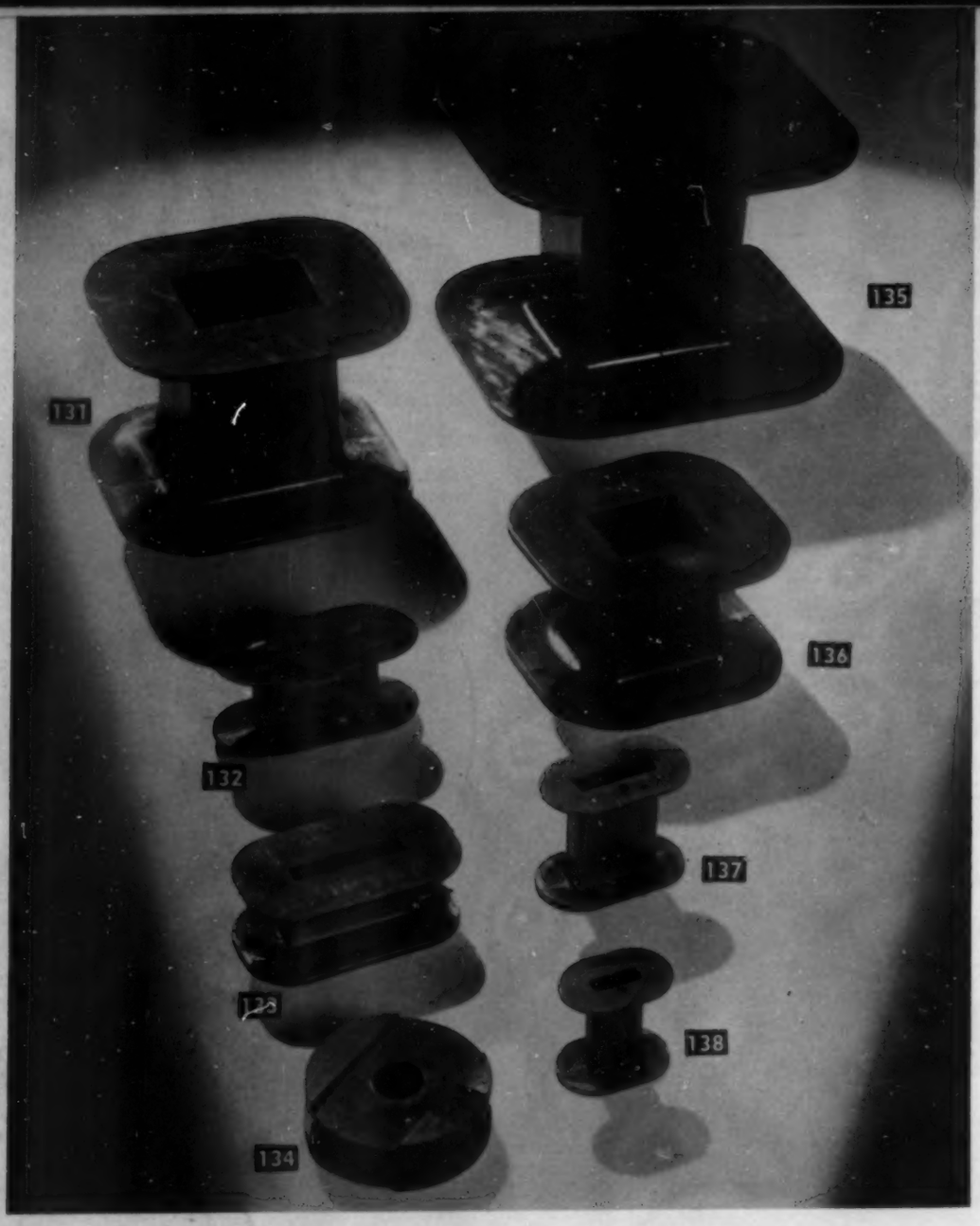
337. Display easel, 4 in. overall height, about 2 in. wide

343. Ash tray with removable 4-in. glass liner, two cigaret rests; diameter, 6 inches

344. Roll top cigaret case with metal base; 2½ in. high, 3½ in. across middle of sides; width 3 inches

345. Candy dish or ash tray with trough. Tray removable; length 5 in., width 3 in., depth 1⅝ inches

346. Large ash tray, holds either book or box matches, 6⅝ in. in diameter. Glass tray may be used separately



Stock molds

SHEET EIGHTEEN

COIL forms for electrical industries can be molded in any of the phenolic materials in proper dielectric strength. Special materials can be used for special installations if required. Samples will be sent upon request.

131. Length 7/8 in.; width at bottom 11/16 in.; inside dimensions 1 in. long, 13/16 in. wide at top; 1 1/4 in. high

132. 13/16 in. long, less than 1/8 in. end; less than 1/2 in. high; inside dimensions, 15/16 in. long, 11/16 in. at top

133. 3/4 in. by 5/16 in. by 3/8 in. inside dimensions. Outside dimensions 1 5/16 in. by 3/4 inches

134. Round bobbin, inside diameter 1/4 in.; outside diameter 1 in.; height 5/16 inches

135. 1 1/8 in. by 1 in. inside at top; 1 1/16 in. by 13/16 in. inside at bottom; 1 11/16 in. inside height

136. 11/16 in. long, 9/16 in. wide at top; 5/8 in. long, 1/2 in. wide at bottom; 13/16 in. inside depth

137. 1/2 in. long by 1/8 in. wide; top and bottom 5/8 in. inside depth

138. 1/4 in. long and slightly more than 1/16 in. wide on both sides. 1/2 in. inside height

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

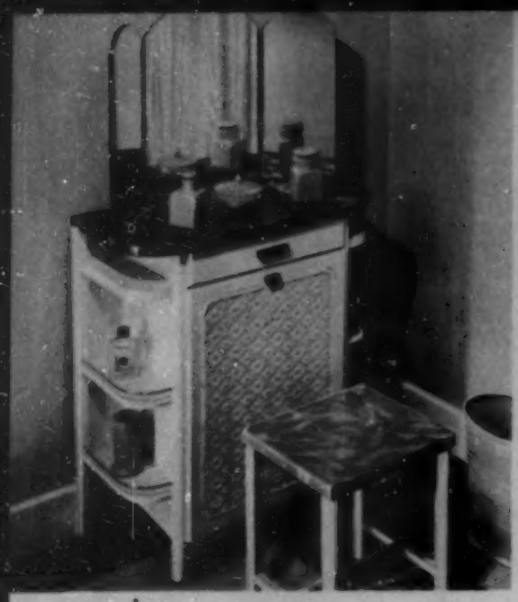
Lamps of tomorrow

THE outstanding exhibit at the New York Lamp Show held at the Hotel New Yorker late in July, under George F. Little Management, was that of the Celluloid Corporation whose "Portraits in Lumarith" proved to be a sensation. The common gossip that acetate shades have become a price "football" in retail circles and that they are associated with "boraxy" lines throughout the field was brought to an abrupt halt as buyers admired this display. To begin with, this company has made vast strides during the past year in improving Lumarith as a lamp shade material. New methods of handling and decorating have been devised. A great deal more attention has been given to the fitness of the material for modern decoration with the result that colors are harmonious with present day trends. Pleated shades which have become more common than grasshoppers in the West were conspicuously omitted.

To dramatize the material, a number of exquisite lamps were fitted with custom made Lumarith shades, each designed especially for the lamp it was to complete. A series of shadow boxes were arranged along the wall of the display, one tier above another, and each was surrounded by a broad gold frame. These "Portraits" were individually treated as complete decorative units, each lighted by the lamp it featured. Walls were painted in appropriate shades of harmonizing color, drapery materials and window treatment were suggested in actual materials, and the ensemble was complete even to miniature pictures, placques, statuary, and appropriate vases with flowers.

Two-tone and three-tone effects were worked out in stripes and bands by a spraying process which gave unlimited range of color (*Continued on page 51*)

Three views of Celluloid Corporation's display at the recent lamp show, showing Lumarith shades in appropriate surroundings



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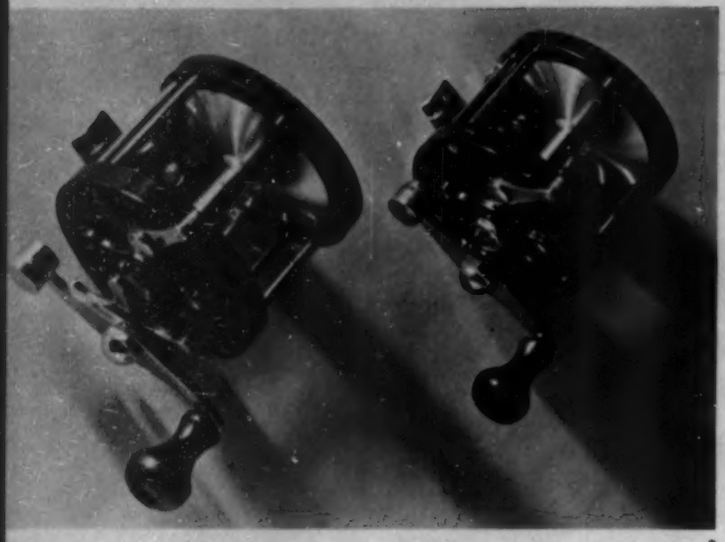

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PLASTICS' PROGRESS

1. It's easy to clean, pleasing to look at and compact in form—this new space-saving vanity hamper for bathrooms. Tops of the table and matching stool are of duPont Pyralin. Made by Vogue Manufacturing Company.

2. Falcon Junior camera is just the right size and price to go places with vacationists. It is molded of Nellite by Watertown Manufacturing Co. for Utility Manufacturing Company.

3. Bronson Reel Co. now avoid corrosion in their salt water reels by the use of molded Durez head and tail plates. Metal parts are chromium plated brass. Reduction gear and bearing supports are concealed in a molded-in recess in the head plate.

4. Baby blue Plaskon caps for their Baby Dusting powder is the choice of E. R. Squibb Company. The color won't chip and there's no danger of rust or corrosion. A neat top for a neat package. Molded by Colt's Patent Firearms Company.

5. These molded binoculars come from France. Their light weight recommends them highly for pocket and purse. Their simple design is well interpreted in brown phenolic with a mottled surface. Loaned by Abercrombie & Fitch.

6. G. & R. Electric Co.'s molded connector makes tape and solder unnecessary for electrical connections. Two tubes of molded Durez, threaded on the inside, slip over the stripped ends of wires to be joined and squeeze the serrated jaws of a piece of brass tubing to grip the wires tightly.

7. Promotional literature to sell *Time Magazine* to prospective advertisers is prepared with the customary thoroughness and intelligence this publication exhibits in all its activities. The cellulose covers and spiral plastic binding on the promotional piece illustrated give it permanence and make it look just as important as it really is.

8. Drinks, whipped cream, mayonnaise—all can be equally well prepared in this electric mixer with a Plaskon housing covering its noiseless mechanism. Molded in ivory, green, yellow, or any desired color by General Industries Company.

9. The firmer the grip, the more fun in cycling—and these Bakelite handlebar grips from Germany, available in many colors, have just this advantage. Applied to the bar with a mallet without danger of splitting or need of an adhesive, they are immovable and retain their color and finish permanently.

10. Carrying knitting without dropping stitches is the guarantee of the illustrated knitting needle anchors made from rods of Catalin. A rubber vacuum center forms a suction to hold securely to the needles and protects the points. Featured by Eldcraft Commercial Products Company.

11. Here's a new twist which brings your tooth brush bristles right into position for action. Bristles are covered with a transparent Celluloid cap when not in use to keep them clean. Molded by Celluloid Corp. for Rubberset Company.

12. Erie Resistor Corp. has developed the molding of a plastic frame around glass in a single operation. The bezels illustrated are for radio tuning dials, but may be made in similar designs for speedometers, picture frames, mirrors, et cetera.

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PLASKON MOLDED COLOR

• AN ANNOUNCEMENT

Effective August 1, 1936, Plaskon Company, Inc. and Unyte Corporation merged in one corporation. Plaskon Company, Inc. is the name of this new company—which is by far the largest producer of urea resin molding material in the world.

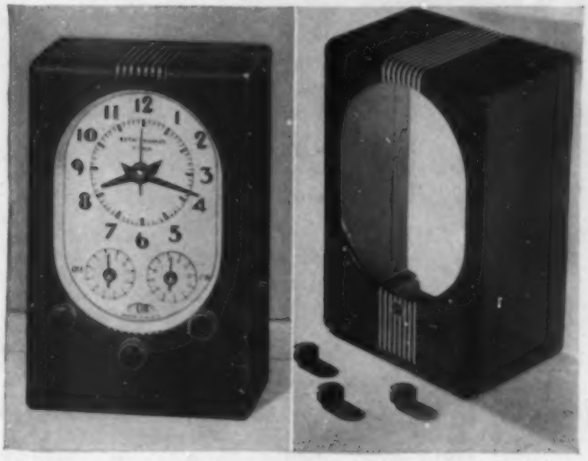
Head offices of the new company are at 2112-24 Sylvan Avenue, Toledo, Ohio. The New York office of Unyte formerly at 521 Fifth Avenue, is transferred to 41 East 42nd Street.

AUGUST 5, 1936

AUGUST 1936

RANGE TIMERS:

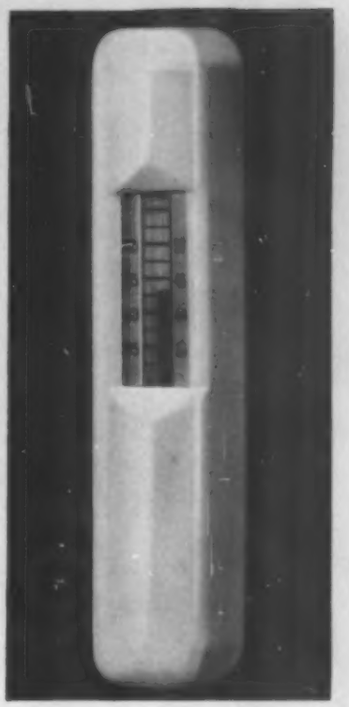
The electric Seth Thomas Range Timer makes it possible for housewives to loll at the Beach Club or over bridge and at the same time attend to their cooking. The timer embodies an electric switch which carries the electric current to the oven of the electric range or to one of the burners as desired. The switch may be set to close the circuit and thereby start the electric current at any pre-determined time, and also to turn it off at any pre-determined time, thereby making possible completely automatic operation of the range. The Timer



also serves as electric kitchen clock.

A special gray Plaskon is manufactured for the Seth Thomas casing so that it matches exactly the dark slate color of certain metal stoves. 95% of users find just the color they desire among the 21 standard Plaskon colors, but when required Plaskon can be made to match exactly any sample. All colors last the life of the articles. Molded by Consolidated Molded Products Corp., Scranton, Pa.

THERMOMETER CASE:



Kelvinator's built-in thermometer is one among several special features of this famous refrigerator which make it a No. 1 appliance in American kitchens. When Kelvinator researchers unearthed the fact that undue cold, as well as heat, spoils food, the thermometer was installed to obtain the safest and best preservation of food stuffs. Its snow white sanitary appearance and ability to take rough treatment led to the selection of Plaskon for the piece.

Also molded of Plaskon on the current Kelvinators are the white lampshade on the interior light, which automatically lights up the box when the door is opened, and the door handle and hinge covers.

No finishing nor enameling is needed to produce the sleek, lustrous surfaces of these moldings, because Plaskon comes smooth from the mold.

The Thermometer Case is molded by the Reynolds Molded Plastic Division of Reynolds Spring Company, Jackson, Michigan.

PLASKON COMPANY
INCORPORATED
2121 SYLVAN AVENUE, TOLEDO, OHIO
CANADIAN AGENT: CANADIAN INDUSTRIES LIMITED, MONTREAL, P.Q.

Photoelastic analysis of stresses with plastic models

BY ARSHAG G. SOLAKIAN
COLUMBIA UNIVERSITY

This is the second and final story outlining the material requirements for stress analysis by photoelasticity

FOR the success of the photoelastic method it is necessary that the transparent materials used for the models should be of isotropic nature, that is, they should not exhibit directional effects in their optical behaviour to polarized light, when they are free of internal stresses. Brewster used glass plates for his experiments as this was the only available isotropic transparent material. The first use of a synthetic material for models is due to Coker, who introduced in 1910 a material called Xylonite (England) because of its higher optical sensitivity to applied stress and the greater ease of making models of intricate shape from this material than from glass. This was followed by Bakelite (America and England) introduced by Arakawa in 1923, Phenolite (Japan) introduced by Tuzi in 1927, l'Orca (France), Pollopas and Trolon (Germany), and Marblette (America) introduced by the author in 1935.

The ideal material for models in the optical investigation of stresses should possess the following properties: (1) High stress-optical sensitivity, (2) High elastic constants, (3) Ease of machining into intricate shapes, (4) Linear relation of stress to strain within the limit of working stress, (5) Dependence of double refraction on stress rather than strain, (6) Optical and physical homogeneity, (7) Absence of initial strain or its removal by annealing, (8) Absence of creep while under constant stress, (9) No permanent set or residual double-refraction upon removal of the applied stress, (10) No development of *edge stress* upon aging of the model, (11) High transparency, (12) Adaptability to built-up and reinforced models.

A high stress-optical sensitivity is usually considered the most important property of a material for photoelastic use because the applied stress in such a model can be kept to low intensities and yet yield a pattern of the stresses with a sufficient number of fringes to give an adequate measure of the distribution of the stresses over the field investigated. A material with a low stress-optical sensitivity may be used, provided a large thickness and a high force is used on the model, both of which are objectionable from the viewpoint of accuracy of results.

An approximate idea of the relative stress-optical sensitivity of two given materials can be obtained

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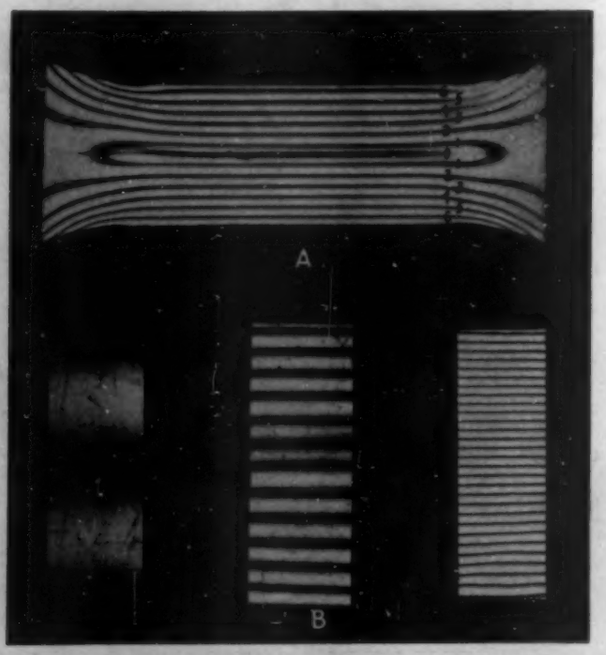

Fig. 1. Fringe pattern showing relative optical sensitivity of Bakelite and Marblette. Fig. 2. Fringe pattern of stresses in beams in bending test. A) Fringes for midsection under uniform moment. B) Relative optical sensitivity of Celluloid (left), Phenolite (middle) and Marblette (right)

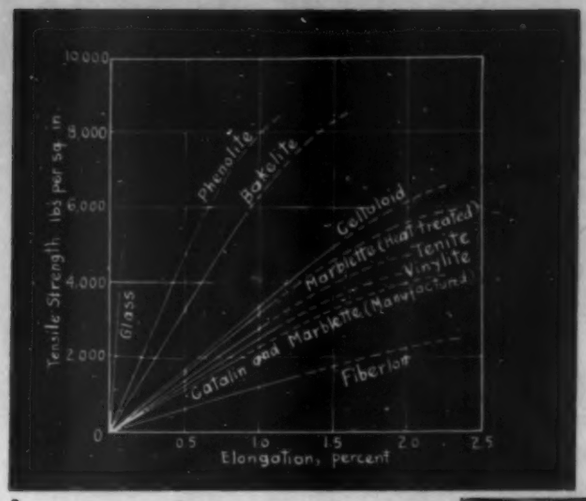

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Fig. 3. Stress strain curves for various photoelastic materials in tension. Fig. 4. Initial stress in a plate and the effect of a cut in the intensified redistribution of the stress

rious photoelastic materials and their comparative sensitiveness, with glass as a basis for comparison, are given in Table I. As a synthetic material shows considerable variation in its physical properties depending upon variations in the heating or curing process, the values in the Table I should be regarded as approximations. Correct values for computing purposes should be obtained from test pieces cut from the plate to be used.

A good photoelastic material should also have high elastic constants, such as elastic limit and modulus of elasticity, which can be determined by simple tension or compression tests. A high elastic limit allows the investigator to use, for a given stress-optical sensitivity, higher stresses in the models in order to obtain a rich fringe pattern. Similarly, for *(Continued on page 60)*

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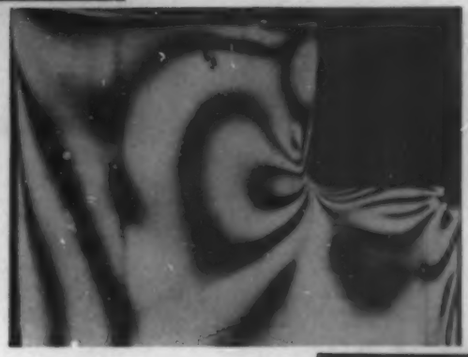


Fig. 5. Structural model with cemented elements. A) Dimensions of model and loading arrangement. B) Stress pattern for corner portion of model in A part of Fig. 5

5

from the fringe pattern obtained by pressing the two different materials (both of the same thickness) against a metal roller, under a uniformly applied force at their outer edges. Fig. 1 indicates the effect obtained with Bakelite (C-25) and Marblette (cast). A more accurate idea concerning the relative stress-optical sensitivity of the materials can be obtained by comparing their fringe-stress values. These are determined, as explained previously, either from a pure tension or pure bending test. In the former case, it is necessary to find the average stress (per inch thickness of plate) that produces, in a given tension test piece, a complete cycle of extinction of light, due to a retardation of one wave length of light. This is a simple and direct method. However, if a photograph of the stress pattern is required, then a pure blending test is preferable. The resulting picture will be as in Fig. 2a. Here the zero order fringe coincides with the neutral axis of the beam, and the fringe orders increase uniformly towards the outer edges of the beam, on both sides of the neutral axis, as predicted by theory. The stress intensity at any point in the middle section of the beam can be computed from well-known formulas given in textbooks on strength of materials. In this way the fringe stress value of the material in the model can be found. Fig. 2b represents fringe patterns for pure bending of three photoelastic materials; namely, Celluloid which has a low optical sensitivity, Phenolite (Japan) the highest of all materials used previously, and Marblette, which surpasses Japanese Phenolite in this regard, as seen from the relatively larger number of fringes obtained under similar conditions of testing. Shown in Fig. 2 on the opposite page.

Numerical values of fringe-stress equivalents of va-

Synthetic resin conference at Gibson Island

BY GORDON M. KLINE

THE Johns Hopkins University Research Conference on "Synthetic Resins" held at Gibson Island, Maryland, for five days beginning July 20 was attended by approximately one hundred of the technical personnel of the plastics industry. Dr. Baekeland proved to be a genial chairman. His timely contributions when the debate seemed headed for the gel point (in the sense of cross linking, certainly not of arrested motion) will be well remembered. The presence on the island of the Est(h)er linkages of many of the conferees served to enliven the social festivities during the week. The congeniality, enthusiasm, and argumentative flairs displayed at the meetings augur well for the development of a first-class technical association of the plastics industry. If and when such an organization is formed, Dr. Neil E. Gordon of the university deserves an honorary membership for his untiring activities in promoting these Gibson Island conferences.

The program of papers served as a skeleton network to direct the discussions that accompanied or followed their presentation. It is expected that many of these papers will be available for publication in subsequent issues of this journal. The speakers and their subjects were as follows:

July 20—Dr. Leo H. Baekeland, "Historical and General"
Dr. E. Emmet Reid, "Theoretical"
Dr. Howard L. Bender, "Colloidal"

July 21—Dr. H. J. Barrett. "Relation between Polymerization and Structure of Organic Molecules"
Dr. H. A. Bruson, "Synthetic Resins Derived from Rubber"
Dr. Harry T. Neher, "Acrylic Resins"
Dr. Ivey Allen, Jr., "Polymerization of Styrene"

July 22—Dr. G. O. Curme, Jr., and Dr. S. D. Douglas, "Resinous Derivatives of Vinyl Alcohol"
Dr. John R. M. Klotz, "Resin-like Bodies from Polymerized Hydrocarbons"

July 23—Dr. T. F. Bradley, "Alkyd Resins"
Dr. A. M. Howald, "Urea-Formaldehyde Resins"

July 24—Dr. Roy H. Kienle, "Kinetics of the Alkyd Resin Reaction"
Dr. B. W. Nordlander, "Mechanism of the Phenol-Formaldehyde Reaction"
Dr. Leo H. Baekeland, "Summary and Conclusions"

Dr. Baekeland carried off honors as both the most loquacious and the briefest orator at the conference. His keen appreciation of "the time and the place" were strikingly shown at the last session when, with the dining hour considerably overdue as the next to the last speaker concluded, Dr. Baekeland gave a C stage reaction finish.

Dr. Reid of the university staff in presenting a review of some theoretical considerations applying to the formation of resins sounded the keynote of the conference by stating that the opening session had not been immediately preceded by a downpour of rain. Considering their individual experiences, everyone knew he just wanted an argument, although apparently later speakers were not always quite so vulnerable.

Dr. Bender, discussing the colloidal aspects of resin formation, postulated that the relative internal resistance to alignment governs the physical properties of a mass and determines whether its structure shall be that of rubber, resin, or fiber. He started the ball rolling by pointing out the resin-like characteristics of ice, and before the week was over everything from the tapioca pudding to Dr. Baekeland's "liquid Bakelite" potion was embraced within the same classification.

Dr. Klotz took the palm for the chemist with the best disguise. It is understood that the head waiter tried to usher him to the banker's corner rather than to the "scientists'" table. His stories regarding amusing incidents arising due to language difficulties during his travels merit wider circulation.

Dr. Allen presented some experimental observations regarding the stability of the polystryene molecule. He was almost startled out of his stable state during the first session when, as he arose to discuss one of the papers, the chairman (his chief) asked his name. The chairman explained that Allen must have stopped in at the barber's on his way to Gibson Island. Although most of the discussions indoors were confined to reactants of the 2,2 and 2,3 orders, systems of higher functionalities were much in evidence on the golf course.

Dr. Douglas in his paper describing resinous derivatives of vinyl alcohol departed from the organic picture long enough to illustrate the application of thermodynamics to resin manufacture. Advance calculations indicated that the reaction was endothermic, but, alas, two fire hoses were required to get the situation under control. Midgely apparently had better luck in applying heat considerations to the stretching of rubber. Needless to say, other alcoholic derivatives not on the program, particularly those of the mint julep type, were the subject of many informal discussions among those present.

Mrs. Midgely claims a high percentage of accuracy in spotting chemists' wives at conventions, but stated that one member of the Gibson Island contingent had her fooled for a few hours. Even at that, it was not the bride, honeymooning at the conference, that spoiled her record.

Dr. Howald who introduced an interesting discussion of the chemistry of the urea-formaldehyde reaction, completed the depolymerization of the long chain molecule which had (*Continued on page 53*)

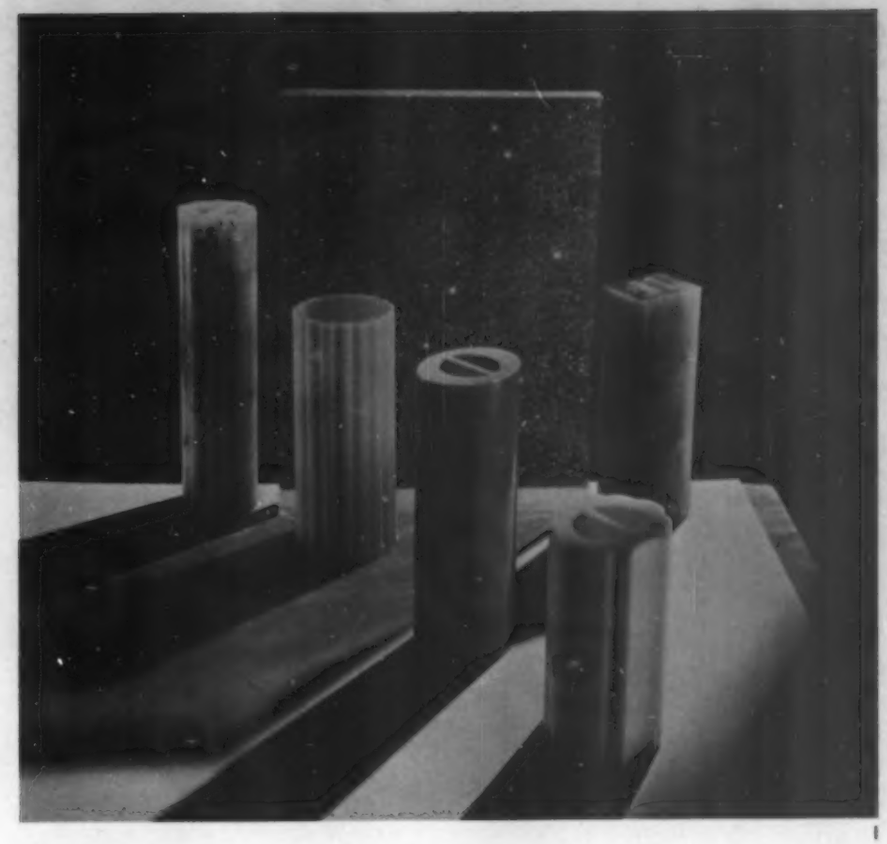


Fig. 1. Rods, tubes, buckle slides and sheet stock are cast in various sizes and shapes for jewelry fabrication

Costume jewelry in the making

BY D. K. BANCROFT

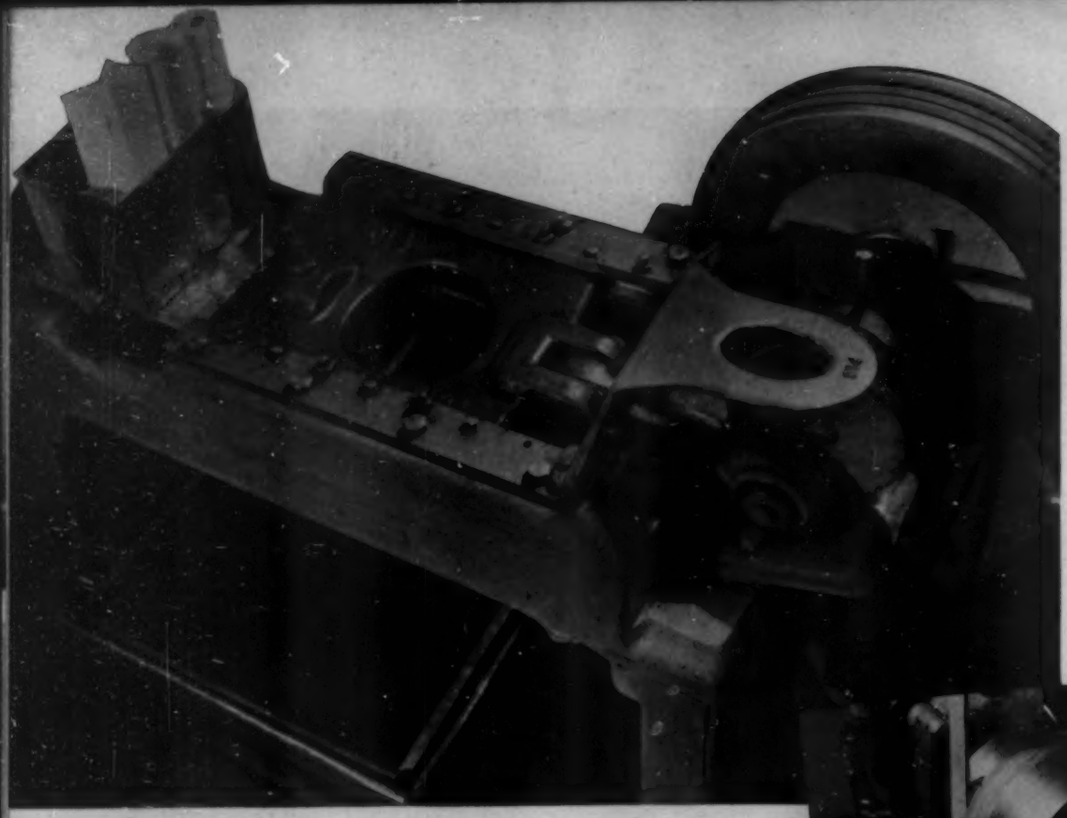
AMERICAN CATALIN CORPORATION

ALTHOUGH the term "plastic" means "capable of being molded" a good portion of the organic plastics produced in this country are not molded at all. They are first cast in staple or fancy shapes, then converted into their fabricated forms by simple machining processes. It follows, therefore, that the fabricators of the non-molding plastics is an important factor in the plastics field. He depends largely upon skilled craftsmen for the success of his product and since no molds are required for the items he makes, he can jump quickly from the manufacture of one product to another with no capital loss involved.

Cast phenolics are used extensively in this type of fabrication and in order to present the processes clearly we will take a theoretical trip through the plant of Ditglo Mfg. Co., manufacturers of costume jewelry, to see how they are accomplished. This company makes its products from Catalin exclusively; they comprise a diversified line of buttons and buckles as well as bracelets, brooches, clips, pins, earrings and the like, most of which are sold to chain stores specializing in ten-cent and twenty-cent merchandise. All items are made from solid material such as rod, tube and sheet stock, or from specially shaped castings, using machining processes involving no molding operations. A large variety of designs and types of products are produced on machines with special attachments in addition to ordinary cutting and forming tools. Designs and colors are changed as rapidly as necessary to meet changing demands of style and the vogue for special kinds of jewelry and similar products.

There is, of course, a sizable market for costume jewelry retailing at much higher prices but machining operations are much the same as for items listed here although more time and more elaborate work is done on higher priced lines. Fig. 9 shows the general character of work done in the Ditglo shop but these items represent only a few of the many produced.

As in most shops working with cast phenolics, the first operation is usually to cut a blank from rod, tube or sheet stock. (Fig. 1). This is commonly done with thin abrasive cut-off wheels but Ditglo uses a Lupomatic slicing machine (Fig. 2) with excellent results. This machine, which was described in detail in our July (1936) issue, has a reciprocating knife arranged to slice off one or more blanks at each forward



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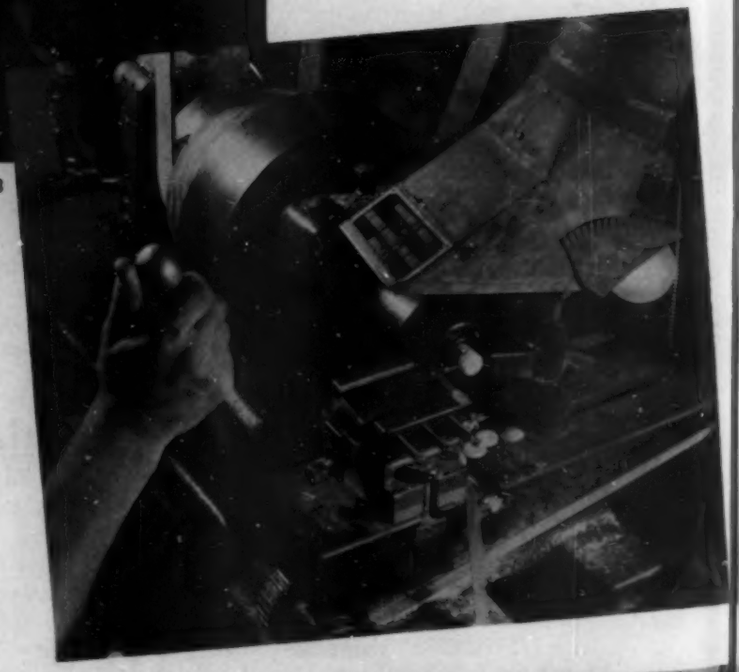

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Fig. 2. Top view of slicing machine with stock shapes of cast resin inserted ready for cutting. Guard is removed to show knife just entering the work. Fig. 3. Hollow-spindle lathe cutting one earring blank and shaping the next at one operation. Fig. 4. Facing a brooch blank in a lathe. Blank is held by treadle-operated chuck while tool is carried on slide moved by operator's right hand

stroke of the knife. The rod or tube to be sliced is first softened by heating; then it is fed through the machine almost as rapidly as the operator can load the heated stock into the holder. As the machine makes about 265 cutting strokes a minute, a large number of blanks can be produced in a short time. If the knives are kept sharp a smooth cut results. The blanks fall into a basket immersed in water to cool them and are immediately ready for subsequent operations.

Since cast phenolics can be had in a wide range of sizes and sectional shapes, the blanks are correspondingly varied. Tubes for buckles and pins may have one or several hollowed shapes giving an open-work pattern as in a pin design with a conventional anchor in the center of a circle. No band or jig sawing is necessary on a blank of this kind. It is merely sliced off, faced and polished, the findings inserted, and is ready for use. Fig. 4 shows a brooch of this type being faced on a Holub-Dusha bench lathe. This lathe has a treadle-operated chuck into which the blank is inserted without stopping the chuck spindle. The facing tool is advanced against the blank to make the cut. The tool is held on a sliding tail stock and its position is changed as required with the operator's right hand while he uses his left to insert the

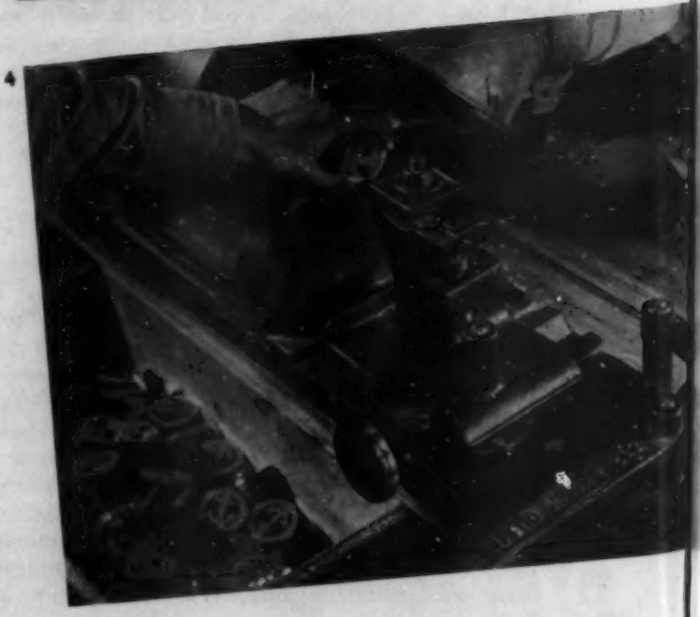

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Fig. 5. Ashing parts with wet pumice on muslin wheels. Polishing is done on similar wheels, but dry. Fig. 6. Portion of tumbling department showing double-deck tumbling units in the background. Fig. 7. Applying findings to the backs of clips and pins. Shanks are forced into holes by this toggle press which is foot-operated.

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blank. Twenty or more blanks may be faced per minute and the shape of cut is determined by the shape of the tool's cutting edge which is made to suit the design in work.

Button and circular earring blanks are often turned and cut from rod in a hollow-spindle lathe as shown in Fig. 3. This makes it possible not only to face both sides of the blank, but to form the edge to the required radius. In this machine, the rod is inserted in the hollow spindle which has a gripping chuck operated by a lever which the operator holds in his left hand. There are two tool holders on the cross slide which are moved by a lever in the operator's right hand. The rear holder carries a stop against which the rod is advanced by hand after the clutch is opened. The cross-slide is then moved away from the operator, carrying the cutting tool into the work. This tool forms the edge of one blank and at the same time cuts off the preceding blank. Some lathes have foot-operated clutches and a lever for advancing the stock.

Blanks for bracelets are cut from tubes about ten inches long which are held in a special attachment on a milling machine. Bracelets in which the edges are not parallel; that is, in which the face is wider on one side than it is on the other are made from cylinders cut into blanks on a simple band saw with a sliding fixture for holding the work at the required angle. Other work done on the band saw includes cutting blanks for special shapes which are not available from stock castings, for example, such as a banana or other fruit and vegetables. These shapes have had a run recently as novelty pins. Such shapes are scribed on sheet stock, then several sheets are fastened together and sawed into the required shapes at the same time. This involves some waste but permits rapid production to accommodate deliveries before the vogue changes. Brooch and clip blanks are cut from rods of the required section on the slicing machine but if the particular piece calls for a blank with a curved back, this can be made from a cylinder of appropriate diameter cut into rings and sawed into segments.

A considerable proportion of all the blanks cut require some carving on the face. This looks a bit intricate in some instances but is done with extraordinary speed by carvers who become expert at the work. Carving is done with the work held in the operator's hand and guided entirely by hand and eye. Operators may do several hundred pieces with the same design, the same number, depth, and arrangement of cuts, and then quickly adapt themselves to a new design as required by changes in production schedules.

Carving in the Ditglo shop is done with special cutters, the wheels varying in size depending upon the type of work being done, *(Continued on page 57)*

Buying design service

By J. F. BARNES

BARNES & REINECKE, INDUSTRIAL DESIGNERS

A controversial subject presented with our editorial ears wide open. Perhaps molders entertain different views and will express them

J. F. BARNES

BEAUTY of form and color has been such an important factor in developing the public's preference for molded plastics, that design for appearance is today a major consideration in all but purely mechanical molding jobs. And in view of this fact, it is easy to understand why, in many cases, the furnishing of design has been accepted as a logical part of the custom molder's service. Molders have used design as an inducement to swing business their way; manufacturers have accepted the service to avoid paying for it themselves. Yet to anyone who has carefully studied the situation, it must be apparent that this practice is unsound from the standpoint of manufacturer and molder alike.

The manufacturer's interest in design is based on one consideration only—its sales value. Design is artistically sound only when it includes selling appeal. The first requirement of a good selling design is that it be well suited to the manufacturer's market. The consumer's location, his buying power, and his current tastes—all must be considered in the development of design if it is to accomplish its purpose. Yet these are points with which the designer has little opportunity of becoming familiar, if he is employed by the molder. To be sure, his design may be attractive, and well suited for molding, but there can be no assurance of its meeting essential sales requirements unless the designer has full knowledge of the market and the merchandising methods to be employed in reaching that market. Such information can best be conveyed to the designer by direct contact with the manufacturer.

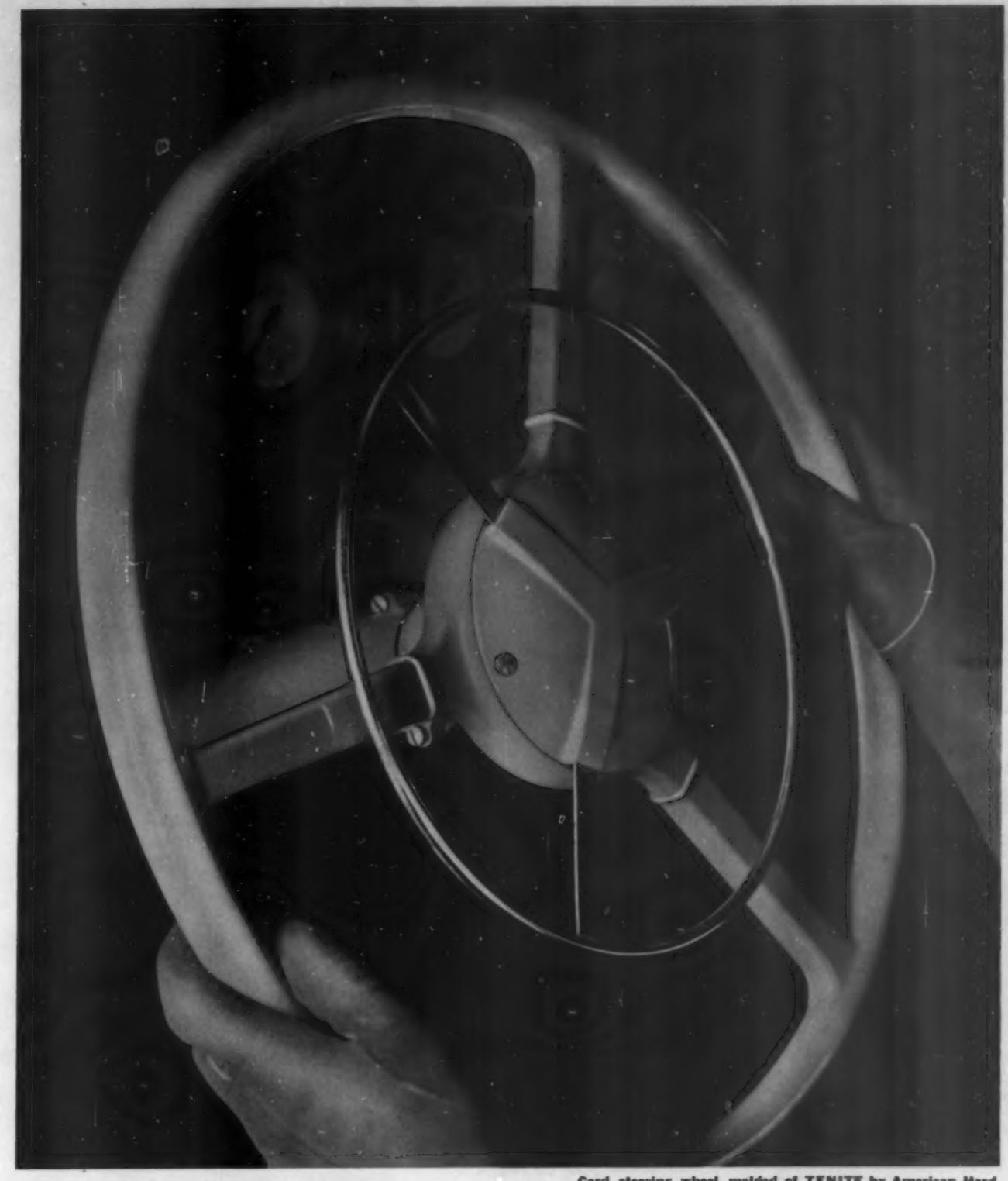
Thus, when the molder supplies the design, the manufacturer often fails to get what he wants—design which will be a real factor in building his sales. From the standpoint of the molder, the practice of supplying design is equally dangerous. Few molders care to risk their chances of getting an important job on a poorly conceived design. And the kind of designer who turns out high grade work must be adequately compensated. If the molder adds the cost of design to his price, that price is likely to be no longer competitive, and he loses any possible advantage the design might have given him. If he fails to include design costs in the price, he at least sacrifices a substantial part of his profit, and may actually take a loss.

It is sometimes argued that the molder who is constantly using design can buy it to much better advantage than the manufacturer who employs a designer only occasionally. While this may be true in isolated cases, in the long run, the purchasing of design by the molder is an expensive procedure. For example, if the molder pays a flat fee for the design, he stands to lose this fee entirely if he doesn't get the job. That loss, of course, must be absorbed from the profits on other jobs. It is surely as great an economic waste to produce design which is never used, as it is to produce merchandise which is never sold. And because of this waste, the molder eventually pays a premium for design. This extra cost must be passed along to the customer if the molder is to remain in business.

Thus it can be readily seen that the furnishing of design by the molder is expensive to the manufacturer and molder alike, and usually fails to give the manufacturer what he is seeking. When the manufacturer employs his own designer, however, there is an entirely different story. Because of his closer contact with the manufacturer, the designer has ample opportunity to study the sales problem, and can develop his design with an accurate knowledge of market requirements. By working closely with the factory, he can meet production requirements and permissible costs. And he can always count on the co-operation of the molder's engineering department to be sure that he has developed a practical, economical molding job.

In this way, the manufacturer gets design, sound from every standpoint, at a fair and reasonable price. At the same time, he is free to place his molding job where he is assured of greatest value in the prompt, accurate production of his needs. The molder, on the other hand, benefits almost equally. By confining his activity to his legitimate function—the production of molded pieces and the necessary engineering service incidental thereto—he is able to quote the minimum price consistent with the proper production of the job, and to make a fair profit at the same time.

Likewise the designer, working directly with the manufacturer, is able to function more efficiently, and return the greatest possible value for his fee. There can be no doubt that the custom molder should and will continue to render his clients valuable service in solving the engineering problems of plastic molding. But design for appearance is a problem not of engineering but of sales, and as such can best be handled by the manufacturer's own designer.



Cord steering wheel molded of TENITE by American Hard Rubber Co. TENITE horn button by General Industries Co.

TENITE

steering wheels mark one of the year's notable advances in the automotive uses of plastics. Motor-car designers turned to Tenite for this purpose because of its unique molding qualities, lustrous coloring, high strength, low heat conductivity, and freedom from exudations that soil hands or gloves. Designers in many other fields are finding in Tenite a material ideally suited to their purpose. Write for new 52-page book on Tenite.

TENNESSEE EASTMAN CORPORATION *(Subsidiary of Eastman Kodak Co.),* **KINGSPORT, TENN.**

NEW IDEAS

● A new benzylcellulose lacquer is being packaged in a combined container and applicator (either of the fountain brush or spreader type) which is itself molded from a plastic material. The material from which the container is fabricated must be insoluble in the solvent which serves as vehicle for the benzylcellulose lacquer; thus, the container may be formed from cellulose acetate or nitrocellulose, or any suitable mixture of these, or a laminated structure with one or more layers each of cellulose acetate and nitrocellulose. When these plastics are used for the container, the lacquer may be dissolved in a blend of gasoline, toluene and butyl acetate. (Joseph Wald and Gerard Legrand, French Patent 777,999.)

● Printing plates which are very durable and much superior to zinc plates are molded from a synthetic resin of the Novolak type. A hydraulic press is used in which the plates are subject to very precise and uniform heat control, and the mold faces are made of a special steel having an accurately known, unusually small coefficient of thermal expansion. By these precautions the molded characters on the printing plates are made accurate in size and shape, so that clear, sharp impressions are obtained when the plates are used for printing. Removal of the printing plates from the mold is facilitated by coating the mold with an emulsion of linseed and castor oils before introducing the Novolak into the mold. (Oscar Clot, French Patent 775,789.)

● Plastics can even be used as the molds for molding other plastics, according to a British invention. Thin but rigid mold shells are shaped from a thermoplastic material which may be celluloid or cellulose acetate. If intricate shape or other considerations make it more convenient, the molds may be made in parts and cemented together. The inside of the mold may be metallized by a spray of copper or tin, or may be coated with glycerol or paraffin, according to circumstances. Hollow articles can be made by placing within the mold a core, which is held in place by removable pins. This type of thermoplastic mold is especially suitable for making shaped articles from hardenable synthetic resins. (L. Nast and J. C. Vredenburg, 2 Charterhouse Square, London, British Patent 440,043.)

● A German concern is offering for culinary or household use, or even for small scale industrial operations, an electrically heated boiling and cooking vessel. Two removable pans hold the food or material to be boiled. The cover is glass lined. Heat is provided by two electrodes. This device, called "Isofix," is provided with a rectangular molded housing, the molding composition being known as "Taumalit." The maker is Isopresswerk, Oberschöneweide, Berlin, Germany. (Dr. H. W., Kunststoffe, June, p. 134-35.)

● Recent improvements in extrusion presses have contributed much to the widening range of utility of the extrusion method for making shaped articles. Orifices are not by any means limited to round or rectangular shapes but are made in a great variety of shapes, some quite complicated. Handles, wardrobe crossbars, lamp bases, wall coverings, door and window frames, picture frames, towel racks, electrical wiring conduits, pencil parts, typewriter rolls, fountain pen barrels and caps, piping for liquids and many other articles can be successfully produced by this very efficient and economical method. (P. Grodzinski, Kunststoffe, June, pp. 121-25.)

● A new plastic material which serves excellently as a substitute for celluloid, without the extreme flammability of celluloid, has the further advantage of being perfectly clear and colorless. In fact the material is so transparent that it is particularly useful for interlayers in safety glass; but in the field of molding compositions this high degree of clarity and absence of color gives the designer full opportunity to bring out his own color effects, either in transparent, translucent or opacified articles. The new plastic is a chemically bleached polyacrylic acid resin. (Imperial Chemical Industries, Ltd., London, England, French Patent 787,573.)

● Celluloid balls, made in the usual way by joining two hemispheres with acetone or a like softening medium, are now made in such a way that for all practical purposes they are seamless. This is accomplished by forming a groove in the mold which is equal in depth (one or two thousandths of an inch) to the shrinkage which occurs at the seam in the ordinary method of joining the halves of the ball. The seam is made to engage with this groove; thus the shrinkage after molding is compensated and there is apparently no seam. (J. M. Jaques, Jaques and Son, Ltd., 37 Kirby St., Hatton Garden, London, British Patent 441,015.)

● A mirror used by linemen for inspecting the porcelain insulators on high tension power transmission lines is made entirely of synthetic resin materials, with the single exception of the glass for the mirror. Each mirror has a handle about 6 ft. long so that the lineman need not climb to the very top of the pole; in this hollow handle is a rod for adjusting the mirror to various positions so that the insulator can be closely scrutinized for detection of the finest hairline cracks. Both rod and handle are made of Turbonit. The mirror frame and the gears and other parts of the position adjusting mechanism are made of molded synthetic resin composition; thus the entire device is non-conducting and cannot carry current to the lineman's body in case of contact with a high voltage wire. The maker is Jaroslaw Co., Berlin-Weissensee, Germany. (Dr. Holm, Plastische Massen, June, pp. 202-3.)

● The number and variety of molded parts in the modern telephone and its accessory equipment has reached a point of bewildering complexity. The first hand telephone in which a few molded parts replaced a large number of metal and hard rubber parts was brought out in 1928; the development continued until now a hand telephone set made by the same firm (Mix und Genest A.-G.) is innocent of hard rubber and uses metal only in the current-carrying parts and the switch mechanisms. The bell housing, the dial and even the bell clapper shank are made of molded plastic materials. (P. Heilbronn, Plastische Massen, pp. 193-6.)

● For successful production of reflectors from plastic materials instead of from glass it is necessary that the plastic shall conform accurately to the reflector-forming surfaces of the matrix and shall not shrink nor become fragile. Thermoplastic resins such as urea-formaldehyde resins, polystyrene, polyvinyl chloride or polyvinyl acetate are suitable for this purpose; so also are some of the cellulose derivatives such as ethylcellulose. Both the plastic and the mold are heated to the pressing temperature and pressure is applied until the plastic sets in the exact shape of the matrix, with all the small angles and surfaces accurately reproduced. (J. C. Stimson, 1055 Pratt Blvd., Chicago, Illinois, British Patent 443,759.)

● Electrical resistances are molded from a phenol-formaldehyde, urea-formaldehyde or vinyl resin composition containing a filler; the surface is then etched with a substance which dissolves a portion of the resin but not of the filler, a polymerizable resistance paint is applied, and the unit is baked till the coating polymerizes. Holes for the terminals may be provided when the resistance is molded, and a conducting area near the terminals may be formed by metallizing the surface in the desired area with silver or copper. This same procedure can be applied to the manufacture of decorative shaped articles, the etching being performed according to an ornamental pattern instead of merely etching to expose the filler as in the resistance units. (S. Bloomenthal, Marconi's Wireless Telegraph Co., Ltd., Electra House, Victoria Embankment, London, British Patent 444,023.)

FIBERLON

ANSWERS ALL YOUR QUESTIONS

1. WHAT IS IT?

A plastic material of jewel-like beauty, available in endless color assortment; phenolformaldehyde base, non-inflammable, nearly unbreakable. Specific gravity 1.33.

2. HOW IS IT USED?

Fiberlon is used by itself in jewelry—buttons—giftware, etc. Also in combination with other materials as in brushes — clock and instrument cases—handles—knobs, and in all manner of trim and decorative combinations.

3. WHAT IS ITS ADVANTAGE?

Fiberlon's richness and depth and permanence of color add sales value to any product. Production is very rapid and new designs can actually be created—manufactured and placed on sale in just a few days; and new moulds, when needed, are simple and not expensive.

4. HOW IS IT MADE?

Fiberlon is made in liquid form, poured into moulds of desired shape, and hardened by curing in heated ovens. Standard shapes include rods —tubes and sheets. Special shapes are cast to order.

5. WHAT DOES IT COST?

The average price of Fiberlon in rod—tube and sheet form (depending on color and quantity) is about 50 cents per pound. Detail prices furnished on request. Finished parts also quoted on request.

6. HOW IS IT FINISHED?

Special shape castings require but little trimming and polishing. Other pieces are machined from rod—tube or sheet.

Fiberlon can be turned — sawed — drilled — threaded — engraved — embossed and shaped with usual machine shop tools. It takes a very high polish by hand method or tumble finish.

THE BEAUTY OF FIBERLON WILL INCREASE YOUR SALES

THE FIBERLOID CORPORATION

INDIAN ORCHARD, MASS.

New York: Lincoln Bldg. **Chicago: Daily News Bldg.**

Western molders play golf

OVER sixty representatives—both molders and material men—of the Western division of the plastics industry, met for an outing and get-together at Lake Wawasee, Indiana, June 30. According to best reports everyone had a glorious time despite a torrential downpour accompanied by severe lightning at night—but the golfers ignored the elements and played under a light rain Tuesday morning.

Allan Fritzsche of General Industries awarded prizes to golf winners at the banquet Tuesday night. The final results line up as follows: Least putts: W. L. Kelly—polo shirt; W. W. Shepard—#4 wood; Allan Fritzsche—pocket secretary. Low net: H. B. Sliger—leather carry-all bag; Orlo Marsh—chipper; E. F. Bachner—pencil. Low gross: Gordon Brown—leather golf bag; H. DeVore—sand blaster. Most 5's: H. DeVore—10 golf balls; most 6's: F. C. Rowley—10 golf balls; most 7's: Joe E. Brown—golf umbrella; most 8's: G. A. Blockburn—belt; most 9's: A. Bryan—belt. Highest score: G. A. Blockburn—head covers. Highest score on any one hole: Henry Kasch. In addition, recognition in the way of further awards was given to the following for scoring birdies: M. S. Carr, Allan Fritzsche, F. C. Rowley, H. M. Harrison, J. E. Horn. In the kickers handicap cash awards were made for the blind bogey. These were in three pots of twenty, fifteen and nine dollars which were divided among the winners. Arrangements were in charge of W. L. Kelly, Chicago Molded Products, Inc.

The sad-looking boy below is Dan Lewis of our Chicago office. He is sad because he has just broken the camera with which he expected to get photographs of the event. Bill Hoey of the Bakelite Corporation took them instead, including this unhappy one of Dan.

Backstage

Twenty-fifth anniversary

On August 10, the Standard Tool Co. celebrates its twenty-fifth anniversary of service to industry. Just a quarter of a century ago Lionel B. Kavanagh, expert on machinery, tool, die and mold requirements for the celluloid and plastics trade, started business with a partner in the rear of 15 Summer Street, Leominster, Massachusetts. The shop grew rapidly and in a short time Mr. Kavanagh bought out the partner's interests, acquired the Stowell Machine Co. plant at 300 Whitney Street and moved to that location. In 1920 he bought the plant of F. H. Cook Co., and for a time operated the two establishments separately, but in the latter part of 1920 combined the two companies at the Cook plant at 75 Water Street.

During the past two and a half decades the firm has seen many changes in uses of materials, from tortoise shell and horn to celluloid and an ever increasing variety of plastics. Processes have been changing and Mr. Kavanagh believes that the new injection molding process, now in its infancy but growing rapidly, will be a boon to manufacturers of celluloid articles. The company keeps abreast and often a step ahead of latest developments, with inventions and patents of various machines and devices for fabricating plastics, and today lists among its customers large and prominent firms throughout the country.

New name

The Beetleware Division of the American Cyanamid Co. announces the change of its name to the "Beetle Products Division of the American Cyanamid Co." Heretofore the name "Beetleware" has connoted such items as tableware and tumblers, etc., to the consumer. Because of the wide diversification of uses of Beetle products for such items as radio cabinets, lighting fixtures, closures, automobile accessories, laminating syrups and creaseproofing materials, the name "Beetle Products Division" will be more fitting.

Increases sales staff

Celluloid Corporation announce the following changes in their sales organization as a result of recent expansion in their business due to increased sales in new fields. Harry F. Eels, formerly asst. treasurer in charge of credits and collections, was appointed on July 3, asst. director of sales of the sheet, rod and tube division. The appointment of Mr. Eels to the sheet, rod and tube division will relieve other individuals in this division to devote more time to increasing demand from the trade.

David S. Hopping was appointed asst. director of sales of the packaging division to take active charge of sales promotional work in this division and to coordinate the national advertising of the company with its field work. S. S. Bareford, formerly asst. director of sales of the sheet, rod and tube division was appointed special sales representative of this division

Backstage

to devote his entire time in the field. Edward H. Miller, formerly asst. credit manager, has succeeded Mr. Eels with the title of credit manager. J. H. Tunison succeeds Mr. Miller as asst. credit manager.

Dr. L. H. Baekeland honored

The Royal Society of Edinburgh, Scotland, recently presented Dr. Leo Hendrik Baekeland, internationally famous American research chemist, with an honorary membership. Dr. Baekeland is president and founder of Bakelite Corporation. The best known of his inventions is Bakelite resinoid, a plastic material which has contributed so much to the growth and development of many basic industries. Among his other inventions is Velox photographic paper. In 1905 he was instrumental in the development of the Townsend electrolytic cell for Hooker Electrochemical Company.

At that time, undertaking a new line of research, Dr. Baekeland brought about his discovery of Bakelite resinoid, which he announced to the world in 1909. This invention is considered his leading work, so broadly useful have Bakelite resinoid materials become in nearly every phase of human activity. The Royal Society of Edinburgh is an old institution, founded in 1783. Its members consist of those who have distinguished themselves in scientific achievements. It is similar to the National Academy of Sciences in the United States.

Resins for cellulosic impregnation

Wood, pulp and cellulose materials in many forms can be strengthened and given greater resistance by impregnation with a new line of resins recently developed by General Plastics Incorporated. The resins are supplied in solution form, and they eliminate the shrinking and swelling due to moisture absorption of wood and cellulose, and also give greater resistance to solvents, acids and alkalies, and greater impact strength and surface hardness. Some of the articles treated with these new Durez resins are pulp toilet seats, wood knife handles, gaskets and clutch discs, golf club heads, baseball bats and similar products.

Improving business

Orders received by the General Electric Co. for the second quarter of 1936 amounted to $77,398,718, compared with $55,163,014 for the second quarter of 1935, an increase of 40 per cent., president Gerard Swope announced today. In the first quarter, the increase was 21 per cent. The second quarter of 1936 was the best since the second quarter of 1931. Orders received for six months amounted to $136,968,597, compared with $104,542,946 for the first six months last year, an increase of 31 per cent.

Sales billed during the first six months of 1936 amounted to $119,273,388, compared with $94,546,274 during the corresponding period last year, an increase of 26 per cent. Profit available for dividends on the common stock for the first six months of this year was $16,592,324, compared with $11,541,429 for the

Backstage

first six months of last year. This profit is equivalent to 58 cents a share, compared with 40 cents a share for the first half of 1935, on the 28,845,927 shares outstanding in both periods. Results for the 12 month periods ended June 30, 1936 and 1935 respectively show sales billed amounted to $233,460,547, compared with $178,360,497 and profit available for dividends on common stock amounted to $32,894,667, compared with $20,516,841. This is equivalent to $1.14 for the 1936 period and 71 cents for 1935 per share on the common stock.

Merge with parent firm

DuPont Viscoloid Co., subsidiary plant of duPont Co., became a regular department of the parent company on August 1. It is now known as the Plastics department with A. E. Pitcher, former president of the Viscoloid Co., as general manager, and J. A. Burckel, former vice president, will act as assistant general manager.

This is the second merger made by duPont Co. in recent weeks. The first of July, announcement was made of the dissolution of duPont Cellophane Co., Inc., and it is now operated as the Cellophane division of the parent company. This action comes as a result of the new tax bill.

Argentine representative

H. A. Dillinger, manufacturers' representative in Buenos Aires, announces that he has facilities for representing American plastics manufacturers in the Argentine. Mr. Dillinger is in this country at present and may be reached by writing to MODERN PLASTICS.

Prominent companies combine

Two of the large producers of urea formaldehyde resins are operating as one unit as the result of the merger of Unyte Corporation with Plaskon Co., Inc., on August 5th. The new company is called Plaskon Co., Inc. and is incorporated under the laws of the State of Delaware. Plaskon has taken over all processes and patent rights but for the time being Unyte will be manufactured and sold under its own name. The main office is now located in Toledo, with a New York office at 41 E. 42nd Street. The officers are those of Plaskon Co., Inc., namely: James L. Rodgers, president; Horton Spitzer, vice president; R. B. Harrison, vice president; C. L. Marshall, secretary; W. L. Feldtmann, treasurer. The directors will be H. D. Bennett, president of Toledo Scale Co., W. P. Pickhardt, formerly president of Unyte Corporation, and James L. Rodgers.

Purchase new business

Richard L. Cawood, president of Patterson Foundry & Machine Co., manufacturers of grinding and mixing machinery, announces the recent purchase of the ball or mushroom grinder and mixer business of A. & F. Brown Co., New York. A complete line of ball grinders and mixers will now be manufactured at the main factory of the Patterson Company.

Letters from readers

Editor, MODERN PLASTICS:

Re: The article "In tune with economy," page 17, May issue of MODERN PLASTICS.

In the first paragraph, second column, the statement is made, "We have found that truer, purer notes are available now that we are using a plastic case. The reason is not easy to explain, but it is nevertheless an established fact."

I wonder if the reason is not disclosed in the enclosed letter (*published below*) comparing the gold and platinum flutes. The theory is that the higher the density of the material the finer will be the tone quality.

You are very likely aware of this, but it may be of interest. And, by the way, why not mold flutes in plastics? This might well give an instrument which would not check or crack (as is the possibility with wood), and which would not dent (as is the possibility with metal). Possibly this would give the mellow notes of the wood flute with the easy-blowing qualities of the metal.

Very truly yours,
Fred Farr

Industrial Designs
311 Prospect Avenue
Mamaroneck, N. Y.

Mr. Fred Farr
311 Prospect Avenue
Mamaroneck, N. Y.

Dear Sir:

In reply to your letter of June 1 with reference to the platinum flute mentioned in the May issue of *Product Engineering*, this flute was tested by Professor D. C. Miller of the Case School of Applied Science of Cleveland, Ohio. Professor Miller experimented with numerous materials. The theory is that the higher the density of the material the finer will be the tone quality. This theory was apparently substantiated by tests at the Bell Laboratories in New York City. It was also reported that the solid platinum flute was superior to one of gold.

Very truly yours,
N. J. Van Ness

Product Engineering
330 West 42nd Street
New York City

Decorators will like these

Arrow-Hart and Hegeman Electric Co. has just introduced their new Ivorylite products to the market. This line provides interior decorators and architects with electrical wiring devices which conform with interior color trends. Ivory was chosen because it answers the demand for wiring devices which stay in the color background when walls are of light shades. These articles are made of Plaskon, and may be easily restored to their original newness with a damp cloth.

Books of the month

The Law of Patents for Chemists

By Joseph Rossman

$4.50. Published by Williams & Wilkins Co.

A second edition of Joseph Rossman's book with the above title contains 380 pages of valuable information on the patents of chemistry. Quoting from its preface: "This work aims to give a rather comprehensive treatment of the technical subject of patent law in language which can be comprehended by chemists without legal training." It tells why the chemist should know something about patent law, describes him as an inventor and tells what patents are worth to him.

It discusses the comparable value to the chemist of patenting his discovery or keeping it silent and sets forth the advantages and disadvantages of both methods of protection. Advice is given as to where to apply for a patent, its publication and results.

In later chapters, the book defines a chemical patent and outlines the difference of process patents, product patents, apparatus patents and those intended for manufacture. Improvement patents are discussed as well as pure discoveries which are not patentable. Then follow interesting examples of well-known patents, listing claim rights, interferences and infringements, and the book closes with a ten-page glossary of patent terms which are explained in considerable detail.

Transparent packaging material

Protectoid Transparent Packaging Material is a new, illustrated booklet published by Celluloid Corporation showing numerous effective applications of this material for packaging a variety of merchandise. The leaflet gives the properties of Protectoid and tells its advantages. A copy is available to those interested by writing to Books of the Month Editor.

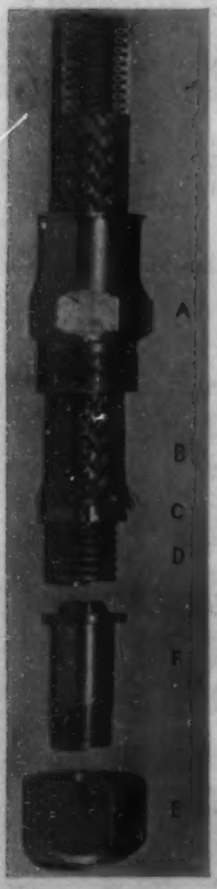
American chemistry survey

Edited by Clarence J. West

Reinhold Publishing Corp.
Volume 10, 488 pages, $5.00

The current volume of Annual Survey of American Chemistry prepared by the Division of Chemistry and Chemical Technology of the National Research Council and edited by Clarence J. West, Director, is an authoritative review of the development and accomplishments in the field of chemistry and technology for the year 1935. It tells of the year's contribution to the various subdivisions of chemistry, with detailed information of the progress of industry in this field.

This volume is the final one in a series of ten covering the period from 1925 through 1935. The set covers the progress made in American chemistry and indicates trends in various fields of pure and applied chemistry in the United States. Reinhold Publishing Corp., publishers of the Survey, is offering the ten volumes complete at a special price of twenty-five dollars to those whose orders are received before August 15th.



To benefit art and industry

ONE of the most hopeful and interesting steps taken recently to further understanding and appreciation of art in industry is the organization of International Society of Arts and Decoration, Inc., with headquarters in Hotel Ambassador, New York City. Although well established and on its way toward becoming a powerful medium for the advancement of the fine and applied arts, it supplants no other organization nor does it aspire to material strength. It is organized under the laws of the State of New York as a non-profit membership corporation which means that money obtained from membership dues must be spent in furthering its aims.

These aims, according to the announcement, are:

"To co-operate with those individuals and organizations who are endeavoring to diffuse knowledge, stimulate interest and reward achievement in the fine arts and art in industry—both national and international.

"To develop a broader public appreciation and a larger market for those of its membership throughout the world who are actively engaged in creation, distribution and maintenance of the fine arts and art in industry.

"To reward individuals and organizations annually for creative achievement by public awards of medals, cash prizes, special funds, scholarships and endowments as may be created from year to year by the society itself or through the administration of special contributions and donations to the society by individuals, estates, communities, or other sources."

This program is as ambitious as it is timely, for those in industry who have discovered the sales benefits of making everyday things that are good looking constitute a rapidly growing roster of well-known concerns. There probably has been no time in the history of our country when good design has been more seriously considered. And surely there has been no period when there was greater need for good design than now.

The idea of the society originated with Barrett Andrews and a small group. Mr. Andrews is a former newspaper man and at present one of the owners of the magazine *Arts and Decoration*. Plans are being laid along sound business lines and the society and its work has been endorsed by the Governors of twenty-three States. No president has been appointed as yet and the governing board is still in the choosing.

Mr. Andrews outlined for us the twofold method which has been decided upon tentatively to achieve the objects of the International Society of Arts and Decoration. First of all, medals which have been designed by Wheeler Williams will be given at the end of the current year. There will be three in architecture and five for the visual arts. Music, literature and the theatre will come in for their share of recognition and reward.

As for art in industry, the stimulation of good design will be furthered by the offer of a medal for the best design in plastics, in metals, in glass, in wallpaper, in textiles, in fabrics, in floor covering, in wood carving, in home and office furniture, in black and

white and color photography. In addition to these awards, there will be international exhibitions, local exhibitions, traveling shows, available to any group of interested persons anywhere in the country, advice on local problems from competent persons and a general helpfulness toward any form of art.

The second part of the program has to do with membership, which will be recruited from the world at large. The first announcement has brought memberships from England, Italy and Mexico besides those at home which came in encouraging numbers. Anybody who wants to see greater progress made in the arts in this country and abroad is eligible to join. There are three classes of membership, a life membership at $100, an annual contributing membership at $25, and an annual sustaining membership at $5, with $5 intiation fee. A subscription to the magazine *Arts and Decoration* will also be given to members.

Numerous benefits to members have been arranged. One of the most important is a department which will be able to recommend experts for the authentification and evaluation of works of art. Another department will collect books, booklets, catalogs and other materials relating to the fine arts and art in industry as published by importers, manufacturers, art dealers and retail stores. This material will be available free of charge to all members as will photographs, prints, books, pamphlets, and other publications to be issued by the society.

Another important service which the society will render is the help it will be able to give member artists in getting their work shown and in finding customers for their designs. Likewise it will help those manufacturers who are members to improve the appearance of their product through advice and through furnishing the names of competent designers experienced in the particular problems at hand.

The plans of the society parallel our own efforts to point out the necessity for encouragement of the groping toward better design in everyday articles that is apparent. The society backed by industry cannot help but have a tremendous influence on the appearance of the home within a few years. It cannot fail to help member manufacturers step ahead of the crowd through improved design.

Lamps of tomorrow

(*Continued from page 27*) to suit the whims of the most exacting decorator. Etched effects, on which lines of the clear transparent material weave themselves into the design, offer latitude for the most versatile imagination. Some of the shades were finished with a cording of silk or cotton chenille while others were smartly plain. The complete absence of over-decoration or gaudiness was their best recommendation.

There were as many varied treatments of the material as there were frames in which to display them and bases of leather, copper, Chinese pottery, alabaster, crystal, American pottery, Venetian glass, Wedgewood, and cut glass each found its complement in a perfectly matched shade. This method of presenta-

tion was chosen to show that Lumarith shades go with every type of base and that the resulting lamps find their way into the smartest homes through decorators of note.

The "gallery" appearance of display was extended to the furnishings of the room in which the soft colorings of the rug and walls were blended with the rich draperies and upholstered furniture into a pleasing entity and a perfect setting. A floor lamp of wood and chromium and a table lamp with a wood base were both fitted with wood-grain printed acetate shades which were shown for the first time. Even the synthetic windows at either end of the room were fitted with transparent Lumarith panes. Carl Sodders, Inc., designers of interiors, 59 Fifth Avenue, were responsible for the decoration.

The du Pont Co. working with Howard Ketchum, color engineer, has worked out some clever ideas in Plastacele. A linen weave effect was presented for the first time in Sundora shades and coronation colors were used with distinction. Green shades of the softest hues were banded top and bottom with silver, while delightfully soft grays and browns were finished with chenille or tape.

Small shades for wall fixtures were treated with an over-all pattern of repoussé, applied with heat and pressure, which gave them an appearance of frosted cut glass. Patterns were evident though inconspicuous and colorings were mostly pastel, some with hand painted ornamentation.

Another unique handling of Plastacele, called lacquering, has a pattern much like that left on windows of a little house in the country by Jack Frost on a bitter morning. More transparent than the linen weave effect or the repoussé, it has its advantage where more light transmission through the shade is desired. Another interesting effect has been obtained by perforating a clear sheet of Plastacele and combining it with another sheet of definite color. The perforations from a self pattern in the material not unlike that of a fabric shade.

There is a growing tendency toward adoption of urea reflectors by those manufacturers who feature lamps bearing the I. E. S. tag of approval. This reflector was originally developed by Westinghouse in the plant of its subsidiary company, the Bryant Electric Co., and was described in detail in Modern Plastics, January 1936 issue.

A quick trip through the five floors of closely packed exhibits revealed little else that was new in the way of plastic applications by lamp manufacturers. Here and there a base or knob appeared in commonplace use. Russell Wright exhibited a table lamp with a column of white Catalin and metal base and shade. He has used this material also for switch knobs of splendid size for convenient use.

There is ample evidence, however, that acetate plastics are well established in the manufacture of shades in every price bracket. They sparingly divide honors with fabrics in the higher brackets and are rapidly replacing the more fragile parchment papers in the inexpensive group. Retailers appreciate their ability to "take it" while displayed in the stores and consumers are rapidly coming to learn that the longer life of plastic materials makes them worth the price in whatever group they buy. The principal difference

between an expensive shade and an inexpensive shade of acetate lies in its design and in the method in which it is handled in fabrication.

It is somewhat amazing that with the broad use made of cellulose acetate sheet materials by lamp manufacturers for shades, that they studiously avoid employing plastics of one kind or another for bases and ornamentation. There was one outstanding exception to this situation in the recent show, however, in the display of the Elod Corporation who have successfully combined sheet acetate and molded urea in lamp bases for the first time. Elod stands for Electrical Lamps of Distinction—and they are just that. Photographs are not available as we go to press but in an early issue we will present this lamp development which will be intensely interesting to many manufacturers of not only lamps, but giftwares as well.

Co-incidental with the Lamp Show at the New Yorker, the Beetle Products Division of American Cyanamid Co. held a public exhibit at its showroom in Radio City. Wall fixtures and overhead brackets of Beetle with pastel shades molded by Waterbury Button Co. were shown, together with a number of Pullman car shades molded by the Richardson Company. I. E. S. reflectors by Bryant Electric Co. were displayed as well as the More-lite fixture developed for Artistic Lamp Company. There were also some rather elegant shades and a clever chromium wall bracket with Beetle shade manufactured by Chase Brass & Copper Company.

The exhibit was lighted in part by one of the Cincinnati Advertising Products Co.'s gasoline-pump lighting fixtures in which the name Beetleware was substituted for the familiar Ethyl.

Synthetic resin conference

(*Continued from page 34*) been gradually breaking down all week. The idea that even the monomer may be convertible to the insoluble form by internal rearrangement without cross linking to high molecular weight compounds brought us literally back to the beginning. Drs. Kienle, Bradley, and Nordlander polished matters off with experimental data and mathematical analyses on the kinetics of resin reactions.

Dr. Thomas Midgely, Jr., chairman of the previous week's conference on the chemistry of olefins from petroleum, obliged by remaining over for the synthetic resin conference to act as assistant chairman to Dr. Baekeland. Mrs. Midgely's services as hostess were also greatly appreciated and were a major factor in knitting the somewhat unwieldly group into a friendly whole, not to mention E. L. Fix's contribution as master of ceremonies at the Tuesday and Thursday evening dances.

The list of registrants at the conference included the following:

Ivey Allen, Jr., Bakelite Corp., R. W. Auxier, Westinghouse Electric and Mfg. Co., G. B. Bachman, Eastman Kodak Co., L. Baekeland, Bakelite Corp., R. H. Ball, Celluloid Corp., E. H. Balz, Mellon Institute, Carl Barnes, Norton Co., H. J. Barrett, DuPont de Nemours and Co., H. L. Bender, Bakelite Corp., G. Benson, Shawinigan Chemicals Limited, I. M. Bern-

stein, Standard Printing Ink Co., J. Bjorksten, Pepsodent Co., J. M. Boyd, Mellon Institute, T. F. Bradley, American Cyanamid Co., B. C. Bren, DuPont Viscoloid Co., H. A. Bruson, Resinous Products and Chem. Co., R. Buffington, Sylvania Industrial Corp., T. S. Carswell, Monsanto Chem. Co., E. K. Carver, Eastman Kodak Co., D. E. Cordier, Plaskon Co., R. T. K. Cornwell, Sylvania Industrial Corp., L. M. Currie, National Carbon Co., L. B. Deatrick, West Va. University, H. R. Dittmar, E. I. duPont Co., S. D. Douglas, Carbide and Carbon Chemicals Corp., F. W. Duggan, Carbide and Carbon Chemicals Corp., H. W. Faust, Monsanto Chem. Co., E. L. Fix, Pittsburgh Plate Glass Co., C. R. Fordyce, Eastman Kodak Co., D. S. Frederick, Rohm and Haas Co., C. S. Fuller, Bell Telephone Laboratories, C. G. Gauerhe, Pittsburgh Plate Glass Co., J. S. Gravely, Baltimore, Md., P. H. Groggins, Dept. of Agriculture, Groton, General Electric Co., E. R. Hanson, Bakelite Corp., A. Haroldson, Continental Diamond Fibre Co., O. B. Helfrich, Resinous Products and Chem. Co., W. Hendry, Texas Co., L. E. Hoag, American Can Co., A. G. Hovey, Beck, Koller and Co., A. M. Howald, Plaskon Co., J. D. Jenkins, Ditzler Color Co., L. Kelley, Goucher College, R. H. Kienle, Calco Chem. Co., S. S. Kistler, Norton Co., G. M. Kline, National Bureau of Standards, J. R. M. Klotz, Stanco Inc., L. K. Kyrides, Monsanto Chem. Co., E. R. Littmann, Hercules Experiment Station, J. H. Long, Hercules Experiment Station, S. M. Martin, Jr., Thiokol Corp., H. F. Meindl, E. I. duPont and Co., T. Midgely, Jr., Ethyl Dow Corp., G. O. Morrison, Shawinigan Chemicals Limited, C. G. Moses, Johns Hopkins University, F. M. Murdock, Fiberloid Corp., J. A. Murray, Plaskon Co., I. Muskat, Pittsburgh Plate Glass Co., H. T. Neher, Rohm and Haas Co., H. P. Newton, Dept. of Agriculture, B. W. Nordlander, General Electric Co., Emil Ott, Hercules Powder Co., J. C. Patrick, Thiokol Corp., C. W. Patton, Carbide and Carbon Chem. Corp., P. O. Powers, Armstrong Cork Co., W. Quattlebaum, Carbide and Carbon Chem. Co., L. V. Redman, Bakelite Corp., E. E. Reid, Johns Hopkins University, J. H. Sherts, Pittsburgh Plate Glass Co., T. Sager, National Bureau of Standards, I. C. Schoonover, National Bur. of Standards, R. M. Simington, E. I. duPont and Co., H. M. Spurlin, Hercules Experiment Station, G. Stieger, American Cyanamid Co., J. J. Sullivan, Holy Cross College, L. T. Sutherland, Barrett Co., R. C. Swain, American Cyanamid Co., A. Szegvari, American Anode Inc., R. H. Talbot, Eastman Kodak Co., K. Ward, Jr., Dept. of Agriculture, R. F. Wakefield, Bakelite Corp, W. C. Weltman, Westinghouse Micarta Co., P. Wiezevich, Standard Oil Development Co., G. H. Young, Mellon Institute.

Thirty years ago—and now

(*Continued from page 11*) a year when another concern, now one of the big fountain pen companies, asked us to make pens for them. In loyalty to Saltz Bros., we turned them down, and incidentally turned down what would probably amount to a vast amount of business a year. The first pens were plain but later were trimmed with little hand-decorated heads with

a ring in the top. It was fashionable then for girls to wear them on a cord or ribbon about their necks.

"Economics have little to do with our business," continued Mr. Berkander. "If it suddenly became the style for girls to wear ankle bracelets we are in a position to jump into that market and supply them. We are governed purely on a basis of style. In 1931 when everyone was practicing strict economies we discovered that girls wanted bracelets that were inexpensive. We had a run of these bracelets and made more than a thousand gross a day. We used nearly three tons of plastic materials a day on this item alone. We made nearly half as many earrings during this time, and by the time these bracelets and earrings were on the wane we were well on the way with new lines. Just give us a definite style trend and we will take our chances on business. We will put people to work on it and while such novelties are sometimes slow in getting started, the first thing we know we are swamped with orders. If the trend is there, there is no need to worry about sales."

At one time Mr. Berkander made a lucky elephant chain of celluloid for Mrs. Harding and another for Mrs. Coolidge. He has letters from both these First Ladies saying they enjoyed wearing the chains and hoped he would do a tremendous business with them. These are the only two such chains he ever made. He refused to capitalize on the fact that they were worn by Presidents' wives and takes his satisfaction from re-reading and displaying their letters of appreciation.

Besides watching style trends, the Berkander firm takes quick advantage of national events. When Lindbergh flew the Atlantic, they had tiny celluloid airplanes with Lindbergh's name on them ready for the market almost before he set the wheels of his plane down in Paris. Right now a great many donkeys and elephants are being made.

This company has created literally hundreds of thousands of different items during these past thirty years. Hardly a day passes without forty or fifty new items being added to one of their popular lines of jewelry or other novelties. Of course many things besides jewelry are made. One of the big lines of the past two seasons has been acetate flowers. These first made their appearance as ornaments on bar pins and other jewelry items. Then larger flowers were made. The idea was developed in the beginning by painting the flowers on bar pins. Then tiny flowers of acetate material were cemented on. From there they simply grew by leaps and bounds until they appeared on everything and more than five hundred additional girls had to be put to work in their production.

"Even though a tremendous volume of business has resulted from the popularity of acetate flowers," says Mr. Berkander, "they were not easily started in the beginning. We tried to put them over a year ago last spring and some were sold. But our big volume didn't start until February this spring. Some of our best jobbers felt that they could not sell flowers while there was snow and ice on the ground. Some of the more conservative made the mistake of not trying. Others started the ball rolling and before long we had them displayed on front counters in many of the big stores along Fifth Avenue. From there on the story is well known. Millions of these boutonnieres have been sold

in every worth while store in the country. We were really the first to make flowers of plastic materials."

During the war period when knitting was so very popular, and for the past two or three years, Berkander supplied needles and accessories for that pastime.

I asked Mr. Berkander where he got all his ideas. He showed me two separate studios where most of them are created. Jewelry has a studio of its own. Party favors have another. Capable designers are in charge of each and no matter who in the organization has an idea, it gets attention and is tried out. Samples are made and everybody gets a chance to pass upon them. From these intimate criticisms and comparisons, new numbers constantly appear. Designers travel about the country a great deal, keeping in touch with what sells and what doesn't. Their designers are really outstanding. They are graduates of art schools and have been with the concern a long time.

"We don't feel that they have to take their hats off to anyone," says Mr. Berkander. "It used to be that novelties of this sort were usually created in France, but now we frequently find our own designs copied in Paris. Naturally we feel flattered when France will copy our things, but when they are copied in Japan we are not so pleased. Japan, because of its low economic standard, comes back here and sells our copied numbers at about one-third what we can make them for here in the United States."

A great many of the items in the Berkander line are created especially for chain stores. It is considered an advantage to supply this trade because there are so many departments in each store that can use such merchandise, that volume is big. Besides jewelry and party favors, the company makes buttons, curtain-pulls and many other items that can be merchandised successfully in chain stores and plastics in some form or other go into almost every department. In addition to the chain store business, the company makes many custom articles for automobile and aircraft manufacturers and others. They make many lines exclusively for jobbers, and parts for other manufacturers which are assembled in their own plants.

"Our business," says Mr. Berkander, "has really been an evolution like everything else. It has succeeded because we have kept our eyes and our ears open. We realize that no business grows which stands still. Our business began by taking a new material and applying it logically to a new use. When I look back at the old jewelers here in Providence, I find that they are using plastics more and more for trimmings and ornamentation. More pieces are being made of plastics because it is a fine material for that purpose. It is clean and lasting and doesn't tarnish. It is really something worth while for little money. Colors are good and designs are easily applied. It is an important basic material for dress and millinery ornaments as well and is destined to go far.

"I think we have played our part in creating and making plastic jewelry really outstanding. I feel sure that there is no cause to worry about the future of this or any other business that recognizes that we are doing business in a rapidly changing world which weeds its own drones. Keeping up with our younger generation and supplying its demands is not only profitable, it is real fun."

Costume jewelry in the making

(Continued from page 37)

Fig. 8. General view of carving department

and a suction exhaust opening at each wheel carries away dust and chips. Operators work seated at a bench and are kept supplied with blanks in suitable tote boxes placed conveniently for rapid handling.

Aside from drilling holes, which is done after polishing, there is little machine work that differs materially from that described except the operations of ashing and polishing. All machined surfaces have a frosted appearance which, with tool marks, must be removed. Tumbling operations are employed for much of the "cutting down" which removes tool marks and takes off sharp edges, but many carved pieces are "ashed." That means they are rubbed with wet pumice on muslin wheels for smoothing the re-

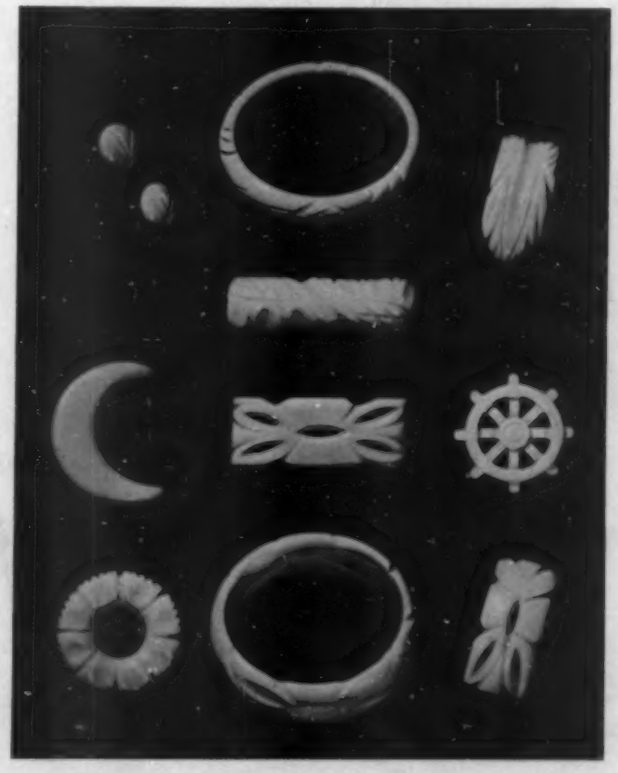


Fig. 9. Representative assortment of cast resin jewelry produced by Ditglo Mfg. Co. for the ten and twenty cent price range in chain stores

cesses. After the pumice has been removed by washing, the parts are polished thoroughly on dry muslin wheels.

Tumbling is done dry (as is recommended for cast phenolics) in maple-lined barrels with steel jackets in double-deck units. Cutting down is done with special compounds and shoe pegs, and thereafter, the parts are tumble-polished when wheel polishing is not required.

Drilling holes in buttons, and for findings in pins, clips and earrings, is done after polishing and tumbling to avoid having the holes filled by these operations. Button drilling is done mostly in Holub-Dusha machines fitted with two or four needles (drills) to drill all holes simultaneously, but most other drilling is done in common forms of sensitive high-speed vertical drill presses. Holes for findings are such size that the shank of the finding will make a tight press fit.

Metal findings (fastening devices for pins, earrings and clips) are purchased ready for use and are applied by girls who use toggle-operated kick presses made by the Standard Machine Company. The shank of the finding is inserted in the hole provided and is then pressed home by a suitable punch in the head of the machine. By using a foot-operated press, the operator has both hands free to hold the finding and the piece to which it is applied in correct position. After this final operation, products are inspected and mounted on suitable selling cards.

Where do we go from here?

(*Continued from page 19*) stay within acceptable costs. But even aside from costs, any attempt at ornamentation, excepting in rare instances, has been most unsatisfactory and trite.

The cast method of making molds, now made possible with the introduction of beryllium copper, permits the mold being cast from the artist's model, reproducing its finest detail to the satisfaction of the artist's most exacting individuality. It places no limit whatsoever on design because costs do not exceed or even approach those of plain and simple forms associated with steel molds. The future popularity and expansion of the cast mold is not to be doubted. For faithful reproduction, there is no better way than to cast directly from an artist's model and this method of reproduction is destined to play a leading part in the future development of the plastics industry. It will not, however, retire the steel mold in the field of precision and industrial molding.

In reviewing the accomplishments of the plastics industry and meditating its possible progress in the future, it may not be amiss to cite a parallel which exists in the aluminum industry. At its start, it had to justify its existence, which it did by way of the kitchen in household accessories. It was called upon for many specific requirements (much the same as plastics) which resulted in many forms of alloys. Today, it finds its place side by side with plastics in technical and architectural usages. It has developed chemico-electrical coloring known as *alumilite* and its progression is almost parallel with that of plastics to date. However, aluminum has recognized the full scope made possible by its numerous alloys and has recently

developed a line of articles known as Kensington Ware (designed by Lurelle Guild) with which it has extended its market to the retail jeweler—a far cry from its original introduction as pots and pans.

Further comparison reveals that aluminum in the beginning was expensive beyond practical application but the price dropped rapidly, as did plastics. It established its popularity as an inexpensive product, as has plastics, but its more costly alloys, undreamed of at the start, has permitted the creation of a line of articles, distinctive in style and unrelated in name, thereby disassociating this product from aluminum as such. With this parallel in mind, we may well pause in reflection and seriously consider the problems and responsibility for the future status of plastics. In view of the material we have to work with, are we going to qualify on an equal footing with our technicians in making use of the full scope of potentialities of the material, or are we going to remain inactive and indifferent to these vastly profitable possibilities?

Resinoids call for better treatment in design. They embody all the qualifications necessary for articles of artistic merit. The field is unexploited and wide open. The public is in a receptive mood for anything that is new. We *are* at the crossroads of trend in design but this statement must not be taken as a prophesy in any mysterious sense. The artist, by virtue of his training, recognizes the slightest deviation from prevailing trend, but until repeated instances of this force for recognition come to his notice, he does not accept it as an indication of note.

The industrial artist, aside from the art education he must possess as a foundation, is always alert to public reaction, and guides himself accordingly if his work is to persist. This, however, serves him as a directional index only, his purpose being to advance in the direction indicated as he finds it. He is master of the artistic quality of his work always but he is ever conscious of the fact that the degree of advancement, as reflected in his work, beyond the present may retard public acceptance. New materials and improved methods of production available at the time urge him forward but public understanding must be definitely established before acceptance results.

I am often asked this question: "Isn't a plain article preferable to an ornate one?" My answer is emphatically, No! Beauty can and should exist, of course, in the plainest of pieces but in all historical records, a period of simple undecorated forms is the result of economics and not a matter of preference. Associated with all eras where plainness prevailed, purchasing power was at low ebb—our Colonial period being an outstanding example, as was this last depression. The resulting misunderstanding is unfortunate but will undoubtedly dissipate as conditions continue to improve. There are three principles upon which all man-made things depend for their justification of existence —*utility, practicability and beauty*. Nothing is worth the effort unless it is *useful*. Nothing can be useful unless it is *practical*. Nothing is complete unless it *reflects our finer sense of cultural appreciation*. With these three factors in mind, can we accept many of the crudities imposed upon the public as pointing to the future in design? I do not think that we can.

We are a cultural people and art is no mystery to

us. Ornamentation is an embellishment reflecting luxury. When created by an artist worthy of his title, and in harmony with its form, its utility, and its practicability, it is accepted as such. It certainly does not make sense to discard the works of centuries, clean the slate, and start all over again with adults thinking in terms of a child's mind. The design tendency of recent years as applied to washing machines, refrigerators, oil burners, kitchen cabinets, gas and electric stoves, air-conditioning equipment, and such, represents real advancement, but when we extend this mechanical style to articles such as furniture, tableware, and articles associated with household refinements, we go too far.

In past history the artist was largely dependent upon Royalty, Nobility and the Church. Handwork was slow and costly yet the artist was not blessed with rich returns for his work. Industry has changed this. Modern machinery and production methods have revolutionized this practice. Liberal public education has created a demand for better surroundings and associations. Production has reached the point where it must depend upon decorative refinements for its individuality if not for its very existence. Plastics are of the new era of materials and with our advanced understanding of functional and decorative design we are in a better position to progress than ever before. To do so, we must take from the past the best it has to offer in decoration and form. We must make it suitable for modernized application to these new materials taking fullest advantage of the symphony of colors made possible with plastics. We must not scrap the past and try to replace it with childish creations. Severe simplicity has run its course. A judicious application of ornamental units, modernized from the classics, will extend and elevate plastics to the realm of objects of art worthy of the interest and growth they merit, the extent of which is without limit.

Photoelastic analysis

(*Continued from page 33*) more accurate results, it is desirable to have high modulus of elasticity and Poisson's number, in order to keep the longitudinal and lateral deformations of the plate under stress within their lowest possible limits. Approximate values of the elastic constants for various photoelastic materials in tension are given in Table II, and their stress-strain curves in Fig. 3. The values assigned for Marblette in this table are for the manufactured plates used for industrial purposes. By a heat treatment process, the author has been able to raise their elastic constants by about 25 per cent.

A synthetic material for use in photoelastic stress analysis should easily undergo machining operations, such as sawing, drilling, milling, turning, filing, polishing, etc., without developing internal stresses as a result of these operations. In the case of brittle materials great precaution should be taken in choosing the kind and shape of cutting tool, speed of machining, etc., to prevent chipping off of sharp edges or cracking of the model, causing ultimate failure.

A linear relation of stress to strain, within the range of stresses used on the model, is a condition for con-

stant elastic numbers and hence accurate results. The importance of this requirement is evident from the fact that the phenomenon of double refraction in synthetic materials is generally known to depend on both stress and strain, as will be discussed later. As a rule, synthetic materials are found to be lacking in strictly linear proportionality of stress to strain, if measurements are made with sensitive instruments.

From an engineering point of view it is necessary that double refraction should be the result of stress rather than strain. It has been generally agreed that in nearly all glasses of various chemical composition, this is actually the case. Experimental studies of Celluoid and Bakelite (cast) have shown that both stress and strain are related to double refraction. It is assumed that will be the case with the other synthetic materials as well subject to experimental verification.

Fig. 6. Fringe pattern of initial stresses in reinforced specimens resulting from shrinkage. (Left, Bakelite; right, Marblette)

Perfect optical and physical homogeneity throughout the entire plate is of prime importance. However, it is expected that all synthetic materials are subject to some variation in physical, as well as optical homogeneity, although not of a degree to interfere with the accuracy of engineering researches within the usual limits of errors.

The majority of plates manufactured from synthetic materials have sufficiently high initial stresses to render their use impractical before they are annealed. In many instances, especially with plates of 3/8 in. thickness or more, the complete removal of the initial stresses by annealing will be found very difficult. Consequently, when a hole or notch is cut into the plate, the presence of the initial stresses in the region thus disturbed will become more accentuated, as is evident from Fig. 4, when the number of fringes in the cut corner are compared with those of the edge regions.

The effect of creep, no matter of what rate or intensity, is always of the nature to introduce a certain

amount of error in the final results. It has been found that in nearly all materials, the rate of creep depends upon the intensity of the applied load, and is always larger during the first few minutes. In photoelastic tests, it is of importance to allow a sufficient time, from 10 to 30 minutes depending upon the kind of material used, between applying the load and taking a photograph of the stress pattern in order to minimize the effect of creep.

The complete absence of residual double refraction and permanent set upon removal of an applied force is necessary, especially in case the model is to be loaded and unloaded successively, as in measuring the sum $(S_1 + S_2)$ of the principal stresses by means of a lateral extensometer. Such effects are more common in models subjected to concentrated forces acting on a small area.

It is generally agreed that, for time intervals of a few weeks, glass does not undergo any optical or physical change. Since in photoelastic investigations the model is usually tested within a day or two after cutting or finishing, glass is practically safe against "edge stress" under aging. Synthetic materials, on the other hand, show aging effects at their edges and surfaces as a result of certain physical and chemical change, that progresses with time. This introduces internal stresses in the model, which distort the actual pattern of the fringes due to an applied force, particularly near free boundaries.

The degree of transparency may have an important bearing on the brilliancy of image on the screen and the quality of photographic prints of the stress pat-

terns. In general all colorless synthetic materials have adequate transparency to satisfy such requirements for photoelastic tests, if polished to proper degree.

The necessity of a knowledge of exact stress distribution in built-up models, representing structural shapes, welded connections, space frames, etc., is becoming more and more important. To construct such a model of elaborate design requires the cementing of the individual members. This must be done under ordinary room temperature conditions, because any subsequent heating of the cemented parts for stronger bond produces undesirable deformations in the members and residual stresses at the cemented joints and along the finished edges. Certain manufacturers of synthetic products provide cementing materials that work at room temperatures, such as the solution obtained by Marblette liquid acted upon by about 5 per cent hydrochloric acid. This works effectively with nearly all photoelastic materials and sets hard within a few minutes. Fig. 5 is a stress pattern for a structural model with cemented elements of Marblette.

An important field of experimentation in which photoelastic materials in the form of models are cast with metal inserts, is the study of stresses in reinforced concrete structures. In previous investigations with Bakelite models reinforced with aluminum rods, the plates cast had high initial stresses due to shrinkage, as seen in Fig. 6. Although the intensities of these stresses can be computed when the actual stress due to a small applied load on the model is desired, the final results may not be of sufficient accuracy to warrant the use of such corrections. When liquid Marblette is used as the matrix in the reinforced plates and solidified by heat treatment, it is found that the resulting plate is practically free from the effect of shrinkage stresses, as seen in Fig. 6. This fact combined with the property of Marblette adhering to metallic surfaces after heating the liquid matrix, makes possible the photoelastic solution of reinforced concrete problems.

TABLE I OPTICAL CONSTANTS

Material	*Fringe-stress value, lb. per sq. inch*	*Relative optical sensitivity*
Glass	1150	1.0
Celluloid	295	4.1
Tenite	225	4.5
Vinylite	90	12.8
Bakelite (cast)	70	16.5
Phenolite (Japan)	55	21.0
Catalin	35	33.0
Marblette	23	49.3
Fiberlon	20	57.5

TABLE II ELASTIC CONSTANTS

Material	*Elastic limit lb. per sq. in.*	*Max. strength lb. per sq. in.*	*Modulus of elasticity lb. per sq. in.*
Glass	....	....	9,000,000
Celluloid	4000	7500	350,000
Tenite	3000	5000	270,000
Vinylite	3000	4500	250,000
Bakelite (cast)	5500	14,500	680,000
Phenolite (Japan)	7000	8500	1,000,000
Marblette	2750	4500	225,000
Catalin	2750	4750	225,000
Fiberlon	1500	2500	110,000

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